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ROYAL

RAFT:

Notes on the History and Progress of Printing

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A Royal Craft:

Notes on the History and Progress of Printing.

The Gutenberg House, Mainz.

A

ROYAL CRAFT:

BEING NOTES ON

The History & Progress of Printing

BY

F. H. S. ELLIS

WITH PREFACE BY MR. E. R. ALEXANDER

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PREFACE.

WHAT is a nation without a history? What is an art without a history, and what is that history without progress? In our public elementary schools we teach the history of our own and other countries of the world. We teach also, but somewhat imperfectly, of the rise, progress, and history of that art which has not only made history, but has made also for liberty of thought and the elevation of humanity. With the advent of the press has dawned a higher civilization, and a finer sentiment with more artistic aims. The rude and crude productions of Gutenberg and Caxton have gone ever onward from their inception, until they have developed into a mighty creative and educative force. The printer is no longer an artist-labourer, neither is he a live machine putting mechanically into operation ideas and methods which obtained generations ago. Synchronously with the moulding of the national character and his pioneership of civilization the printer has improved himself;

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the introduction of the Monotype and Linotype methods of production are not his ultima thule. From methods of crudity to some measure of perfection he has attained in "the art preservative," but the "ideally simple" has not yet been reached. Long and valuable experience in certain orthodox methods make for proficiency, but not progress, but the problem-perplexed printer works out his own salvation, and leaves behind him some improvement on the page of time, his works live after him—and so do his errors and imperfections—his successors profit by a knowledge of these blemishes, they appreciate his aims and improve his methods of working. So the wheel of progress moves forward, sometimes rapidly, sometimes very slowly, but always forward. It is not the outstanding genius of one man, or of one generation, that has contributed more than another to the progress of the Royal Craft, but rather the collective genius of the many, homogeneously combined and collectively superior to any individual effort.

In consenting to pen a brief preface for this little volume I confess to the hope that a perusal of its contents will imbue the lay reader with the enthusiasm of its author, and that his succinct survey of the marvellous rise and progress of printing may secure not only an admiration for the pioneers of the art, but that it may also, in the hands of the craftsman, be the

necessary incentive to perfect his knowledge, for himself and for those who follow. To one who has spent more than a quarter of a century in the education of young printers, I can say, with perfect knowledge of the fact, that the reading of interesting works on the subject of their handicraft has led more than one from an easy-going life of hum-drum to one of active research and improvement; and to all I commend the pages of this work, in the earnest hope that the author's efforts may have a like effect, and his work will be well rewarded.

E. R. ALEXANDER.

Principal of London Polytechnic
Pioneer Technology Classes.

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A ROYAL CRAFT:

NOTES ON THE

History and Progress of Printing.

I.

Introductory—Earliest Methods of Printing and Paper Making.

THE invention of Printing has always been recognized by students as a subject of considerable importance. There is no mechanical art, nor are there any of the fine arts of whose early history so much has been written, as of the origin and evolution of Printing. Such a subject is as mysterious as it is inviting, being enshrouded in an unusual degree of obscurity, and manifesting a marked divergence of opinion amongst its many varied chroniclers.

Printing, or more correctly termed Typography, is sometimes spoken of as a "Royal Craft," the "art preservative of all arts," and as a "handmaid to every form of modern education." Such expressions are, without doubt, justly employed when it is considered how important is its position in modern affairs.

The most sanguine typographic craftsman in the Fifteenth Century, probably never dreamed that his art would play such a significant part or grow to such colossal proportions as we are familiar with to-day.

History and Progress of Printing.

Printing comes down to us, in truth, from a very early age, too remote for any authentic record. In the ruins of the cities of Babylon, Assyria, and other places in the East, we have abundant evidence of a crude method of writing or impressing symbolical signs and figures on clay, and making them permanent by means of baking, and so using them in the building of their temples and dwellings.

Similarly the Chinese, in early times, long before the Christian Era, had a system of printing by means of engraved wooden blocks, by which method they duplicated upon slips of bamboo and a fibrous kind of bark by means of hand pressure. While the Chinese appeared to have possessed far more intelligence and civilization than most of the contemporary nations at that early period, it is a startling fact that little progress has since been made in the mode of printing then in vogue—perhaps something may be said for the peculiar language not readily adapting itself to the use of movable characters. Amongst nearly all the early Eastern nations, seals or dies appear to have been commonly used in the making of coins or stamping ornaments and articles of use in the manner already indicated, notably among the Greeks, and later with the Romans; but it is a matter of surprise that nothing beyond these engraved dies has survived the latter, considering the many advantages of civilization and learning they enjoyed.

Montfaucon, in his "Antiquities," relates a few interesting particulars of some large sigilla of the Romans, in which names were carefully cut in Roman capitals. Probably they were used for distinguishing the various earthen vessels,

by impressing them on to the clay while it was yet plastic in the mould. In the collection of the Duke of Richmond there is a sigillum of a very rare kind, with raised letters made of brass, two inches in length by one inch in depth, having on the back a ring for the purpose of making the impression. The letters are beautifully cut, in two rows, very similar in appearance to our modern Roman type. The name on the sigillum is that of Caius Julius Cecilius Herminius, and was presumably used to impress his name officially to any paper or document requiring a signature. As the ground above the raised lettering is rough and unfinished, it is hardly likely to have been used in the marking of soft pottery moulds such as those already mentioned, for the sufficient reason that the unfinished appearance would have given a blurred result. This signet was found near to Rome, and easily lends itself to modern use. No doubt this is the nearest approach the Romans had to actual printing as now understood.

Virgil tells us that brands, with the owner's name, were used to mark cattle, very much after the manner of a stencil plate. The Emperor Justin, who could not write, used a similar contrivance.

The Egyptians, with all their wonderful knowledge of the Arts and Sciences, were not without their crude form of engraving and impressing (by means of hand) hieroglyphics on the facia of their huge monuments and temples, much in the same way as that of Babylon and Assyria, or the terra-cotta impressions of the Romans.

In A.D. 175 the text of the Chinese classics was cut upon erected tablets of wood and stone, examples of which still exist.

Marco Polo, the Venetian explorer, on his return from China (where he was Governor of one of the Eastern provinces during the reign of the Mongol grand khan, Kubilai), at the end of the Thirteenth Century, described the printing of paper money by the use of a stamp and some vermilion pigment.

This peculiar and ancient style of Xylography made little progress in development, each succeeding age, with scarcely any perceptible variation, repeating that of the preceding one. In the making of these blocks great care was taken in the selection of a wood of fine and close quality. The surface was then treated chemically and painted, from which impressions were taken with ink made from the sap and colouring of trees, put on to the block by means of a pad, the absorbent nature of the wood so treated oftentimes determining the depth of colour. The paper, after being placed in position on the block, was rubbed until the desired impression was obtained, and the sheets, being printed on one side only, required to be fastened together before being made into books.

The whole of the writings of Confucius (six vols., 8vo), dated about A.D. 900, were produced in this manner. The pages had the appearance when printed of a faded, rusty brown colour; the paper being remarkable for its opacity and thinness, and not less so for the toughness of its texture. These books, though entailing so much labour in the preparation of blocks, and then the tedious mode of printing, were sold at very small sums, at least judged by the present-day standard, but no doubt the expense of production was a very small consideration also.

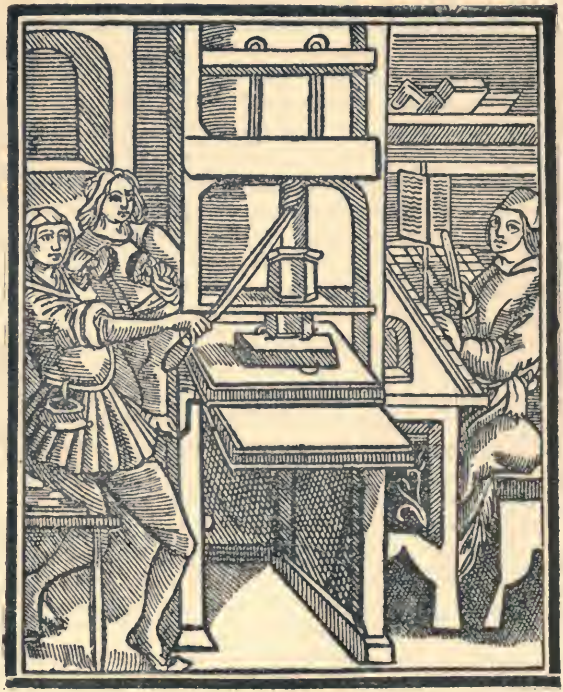
Many attempts were made by various Emperors of China from time to time to improve the general style of Xylographic printing, but to little purpose. The procedure to-day in China, despite the Western invention, is essentially the same in method as that practised by them so many centuries back.

In addition to their primitive ideas of printing, they likewise claim to have invented the proper manufacture of paper out of cotton, vegetable fibre, and silk, from about 120 B.C. The Egyptians were makers of papyrus and paper at a later period, and from them the knowledge seems to have spread to the Arabs, while no doubt many of the valuable Assyrian manuscripts were written upon paper of the time. In the Twelfth Century we find the Moors in Southern Spain making paper with an admixture of linen rags. The first paper manufactory in England is given as 1475, but probably it is nearer the date 1695, when it was first made in Scotland.

Mention should also be made of the manufacture of paper from rice by the Chinese, the result being a paper in appearance of the most perfect kind, save that its use is somewhat restricted, owing to its brittleness and difficulty of handling. On the other hand it lends itself very readily to the skilful hand painting of the Chinese artist, whose colouring is proverbial for its effectiveness, in some measure due to the splendid surface and opacity of the rice paper.

To-day we are confronted with an endless variety of paper of every conceivable kind, but although the purifying and manipulation by machinery to produce this variety has become almost perfect, it is not too much to say that the

principle of its manufacture remains almost precisely the same as in the far-gone ages. Wood pulp has more largely come into present-day use in order to keep pace with the vast demand for cheaper kinds.



Earliest Form of Printing Press.

II.

Invention of Movable Type and the Printing Press—Johann Gutenberg, the Inventor—His Career—Enters into Partnership with Faust—A Law Suit, followed by Loss of Office—A Fresh Start—His Death.

PRINTING, by means of crude wooden blocks, engraved after the manner of those in use amongst the Chinese, was much in vogue in Europe from the Thirteenth Century, prior to the introduction of movable metal types. Whether the idea came from the East is a point very difficult to establish with any amount of certainty.

The partially idiographic character of the Chinese writing would render the use of type a matter of extreme difficulty. Therefore the invention of movable and separate characters came upon the world in the Fifteenth Century as an entire revolution. Theodore De Vinne, an undoubted authority on printing, observes: "That the great feature of the invention consists in the mechanism for making them—first casting the shanks or bodies to suitable size, and then cutting or engraving the letters upon them—and the mould for casting them whereby they could be made more cheaply than by engraving, and more accurate as to body, which is essential, and so combined and interchanged with facility. In short, the invention of the adjustable mould, with its appliances of punch and matrix, is where the fame of the inventor rests."

With the coming of movable type the block books gradually declined, though attempts were

made to adapt them to the altered circumstances, but these only lasted for a short time. Their manipulation and use were found both cumbrous and expensive. Most of the religious ideas of the time were depicted by their means, printed on one side of the paper, examples of which are still to be found to-day. Perhaps the most noteworthy specimen of this method of printing is the Biblia Pauperum, a reduced kind of Bible, dated about 1429.

The claimants for the invention of typography number about fourteen, viz.: Castaldi, Coster, Faust, Gaensefleisch, Gresmund, Gutenberg, Hahn, Jenson, Louis de Vaelbaeske, Mentel, Pannartz, Regiomontanus, Schoeffer, and Sweynheym, and even more numerous are the towns which claim the honour of its birthplace. After many investigations the number of inventors were reduced to four as being most probable—Castaldi, Coster, Gutenberg, and Schoeffer. The claims of Castaldi, the Italian, however, are extremely vague, and outside of Italy were never accepted, but at one time were very strongly believed in by his own countrymen. Schoeffer's claim to be the pioneer is entirely discredited. The real issue seems to lie between Gutenberg and Coster, and very little doubt now exists as to Gutenberg being the real inventor, though many uphold Coster's priority rather than as a successor to Gutenberg.

There is abundant proof that Laurentius Coster (a native of Haarlem, Holland) engraved upon wooden blocks and also worked from movable wooden type, to which he applied a kind of glutinous ink, and so obtained results similar to those in general use at the time. It is said that Coster cut his characters in the manner of the hand-

writing of the scribes, with abbreviations and other oddities peculiar to the manuscript writers at that period.

Various books were issued by Coster, one of which, the "Speculum Salutis," dated 1440, is claimed by Theo. Scriverius to be the first book ever printed. While it may be doubtful to fix the exact chronological order of Coster's work, there is good reason to believe he was to some extent contemporary with Gutenberg, and in the matter of engraved wooden, movable characters, would seem to warrant some claim to an independent genesis of the invention.

Johann Gutenberg, the generally accredited inventor of the art of typography, was born at Mainz, 1398-1400. He was the son of Frilo Gaensefleisch, but, according to a German custom at that time, assumed his mother's maiden name rather than it should become extinct. Succeeding generations have handed it down as inseparable from the invention of movable type, and very few to-day doubt his claim to be the pioneer of the art.

Up to the advent of Gutenberg, ignorance of learning was everywhere prevalent. Scarcely anyone could spell, and seemingly few, even of the well-to-do classes, could afford to purchase a copy of the Scriptures, and fewer still were able to read them. Compared with to-day, we can form a just conclusion of the power of the printing press, and what an influence it began to exercise in the elevation and spread of education among the masses.

Much of the earlier life of Gutenberg was spent at Strasburg, where for many years he occupied himself in various employments other than the

invention upon which his fame rests, for it was not until manhood he was bound to one named Dryzehn to teach him the secret of the wonderful art, as he then understood it, but owing to the death of Dryzehn the contract was broken. He, however, made considerable progress in its

Johann Gutenberg.

development, and gained a good insight into the practicability of his undertaking. Unfortunately, troubles, in which he became involved, compelled him to quit Strasburg in 1448 and return to his friends at Mainz, and while there his brother,

Gaensefleisch, co-operated with him in the craft. During the sojourn at Strasburg, it should be noted, John Mentel acquired some knowledge of the invention, and hence gave rise to the claim of that craftsman to its origination.

Type used in Printing, 1466.

Added to Gutenberg's misfortunes, and pecuniary loss entailed as a consequence of such actions, it was found a matter of difficulty to keep the secret to himself. Its value as a means of reproducing the many MSS. writings, and lessening the vast amount of copying then prevalent, was a patent fact which soon became known, and caused a good deal of uneasiness amongst the clerical copyists, whose opposition to the introduction of printed matter became very determined, and no wonder, their means of livelihood—not to mention the power they had wielded by retaining the knowledge in their own hands—being now jeopardized.

The whole career of Gutenberg was one long struggle against adversity and privation of one kind or another, yet, in spite of opposition and financial distress, he remained true to his object, and carried out his designs with commendable perseverance, but he lived to see only the dawn of his triumph; the fruits of his untiring zeal and inventive genius came when his physical powers were little able to enjoy them. Those to whom he confided the secret richly benefited by such

acquisition, as did also his own personal friends, to whom he had so often resorted for assistance in money or labour.

Gutenberg's first publication was issued for the fair of Aix-la-Chapelle in 1439, and was quickly followed by a number of smaller productions, all

Gutenberg's Wooden Press, 1450.

executed upon a crude wooden press. This press was strongly made, with two upright timbers and cross pieces. In the centre was the bed to support the type, and a platen, or top piece, which moved down on to the type by means of a

wooden screw. This press is supposed to be the first ever made, and was constructed under the superintendence of Gutenberg by Conrad Saspach in 1436. The inking of the type, while on the bed of the press, was done by two leather padded balls, after first freely working together in the hand. The paper was laid over the inked surface and surmounted by a soft substance to ensure the impression when screwed down.

With a view to issuing a complete edition of the Bible, Gutenberg entered into a kind of partnership with John Faust (1450), who agreed to furnish money to enable him to carry out the enterprise, Faust to hold the entire appliances as security, and to further receive half the profits expected from the sale of the productions, in addition to a six per cent. interest on the capital advanced.

Faust was by profession a money-lender, and hailed from a small village on the Rhine, named Gernsheim, near to Mainz. Gutenberg had frequently appealed to this source for assistance, and on this particular occasion 800 guilders were advanced, with an additional 300 to provide for paper, vellum, ink, wages, etc.

The project of Gutenberg in bringing out a complete Bible was a great undertaking, for up to that time the Scriptures had only been issued in fragments or parts. This, the first completed Bible published, emanating from Gutenberg's press, was remarkable as much for its completeness as for its many peculiarities. It appeared in the prevailing style of Gothic character (about 1450-1456), printed upon vellum, and contained 1282 pages, two columns to a page, and forty-two lines to a column, but without a title-page, date,

name of printer, or place of publication. The headings and initial letters at commencement of chapters were cleverly painted in by hand. It is commonly known as the forty-two line, or Mazarin Bible, so called from the discovery of a copy in the library of Cardinal Mazarin in Paris. It was altogether a costly and laborious undertaking, and reflects credit upon the persevering industry and noble aim of Gutenberg to carry through so large a work with such signal success. Every letter, be it remembered, had to be engraved separately, and, although conferring so much honour on the printer, in publishing this, the first complete Bible, the financial loss entailed unfortunately proved his ruin.

Fabulous sums have been realized at various times for copies of this rare edition, and as recently as 1904, in London, a good copy fetched as much as £3850. Both in London and Berlin fine specimens can be seen.

Faust, having got tired of advancing money, instituted a law-suit against Gutenberg. He had now received a very considerable sum in order to enable the work to be carried on for five years, and the law-suit terminated disastrously for him. Gutenberg was ordered to refund a large part of the capital, with interest, and naturally a dissolution of the so-called partnership followed.

A few years later Gutenberg had sufficiently recovered himself to take up the work again. Means were forthcoming to enable him to recommence with the help of his former craftsmen. The Chancellor of his native city, Conrad Humery, came forward and befriended him, supplied the means, and all for a time seemed fairly successful. Two years after his re-establishment (1460) he

issued "The Catholicon," a large folio volume, being a compilation of a Latin grammar and dictionary, one of the best executed works of that time; also another edition of the Bible, known as the thirty-six line Bible. He also printed many Letters of Indulgences issued by the Pope.

Some little time later Adolphus, Count of Nassau, created Gutenberg a Gentleman at Court, in recognition of his invention, and the benefits he had conferred upon the general public by the many valuable productions of his press. Following soon after this tardy, but somewhat scanty, recognition of his genius, his office passed into the hands of relatives, and Gutenberg practically ceased from the work he had so successfully pioneered.

There is little record of the closing days of the inventor's life. His career seems to have been full of difficulties (oftentimes lacking the very necessaries of life) but, in spite of adversity and insufficiency of means to carry on his work commensurate with his undeniable enthusiasm, he triumphed, and the world is to-day the richer, and perhaps that fact is, in its everyday evidence, the best monument to his memory. He passed away on the 24 February, 1468, at the age of 68.

The pathetic story of Gutenberg's struggle against poverty and lack of patronage was very recently told, in celebrating the 500th anniversary of his birth, and how he had been well-nigh forgotten, so much so, that the place where he was buried is unknown. It falls to the present time to recognize in him one of Germany's greatest inventors; but surely he is more, and it is not too much to say that he is one of the greatest inventors the world has seen.

III.

Progress of Typography (under Faust and Schoeffer) throughout Europe—Opposition from many quarters —Notable Craftsmen.

IMMEDIATELY following upon the dissolution of the partnership with Gutenberg, Faust, failing to recoup himself for the money advanced — the speculation not realizing his expectation—seized possession of the office, and set up with one named Peter Schoeffer, an employee, who perforce had charge of the work, and being an ingenious man, he effected great improvements, notably the invention of matrices for casting the type, instead of cutting them by hand, which so pleased his patron and co-partner, Faust, that he gave him his only daughter in marriage.

Schoeffer, by his undeniable skill, has produced some remarkably fine specimens of printing. Perhaps the best known work was the "Psalmorum Codex" (1457), a handsome production, printed upon fine vellum, with hand-painted initials, the most ancient book known printed with a date or inscription. A notable American recently purchased, from a well-known bookseller in London, a copy for the sum of £5250 (1459 edition). Twelve copies of this edition are said to be in existence, and nine only of the 1457 edition. Among other works emanating from this press, mention should be made of a book called the "Durandi Rationalè"; a Latin Bible (thought to be the most important of Faust and Schoeffer's

productions); a folio Psalter (1459), the large initals of which were stamped in by hand, a separate stamp being used for each colour. The psalms in this book were arranged in the order they were sung by the Benedictine monks. It is one of the best examples of Faust and Schoeffer's printing, and, like most of their productions, is executed on fine vellum. A copy belonging to Sir John Thorold was sold in 1884 for the large sum of £4950.

The first poster ever produced came from this press. It was printed by order and direction of the Elector Diether, and contained his "Declaration" against Adolphus, Count of Nassau. It measured two feet by sixteen inches, and consisted of 106 lines.

Faust, who had done so much to further the progress and development of the art by the means at his disposal, became disheartened by a series of misfortunes, culminating in the loss of his office by fire—a period from which his prosperity seems to have somewhat declined. He afterwards went to Paris, to try and promote the sale of his Latin Bible, and remained there until his death, in 1466, which was due to the prevalence of the plague.

A story is current that Faust sought to dispose of these Bibles as manuscripts. Knowing the strong opposition of the caligraphists he tried to conceal the printing of his books by issuing them in the character of the handwriting of the day, and offered them at sixty crowns apiece, while those written by the scribes were charged at 500 crowns; but the price being so much lower than that usually charged, and the work so perfectly correct, the suspicions of the Parisians were aroused,

which led to Faust being indicted as a conjurer. The supply was equal to the demand, and this, coupled with the fact that they were printed in red ink—which they averred was his own blood —gave rise to many suspicious charges of his being in league with the devil; hence arose the legend of the Devil and Faustus. The attention of the Legislature of Paris was called to his work, who expressed their admiration for the beautiful finish and alignment of the lettering of his book. Faust, however, to extricate himself from the difficulties which had apparently overtaken him, revealed the secret, with the result that they magnanimously exonerated him, because of the utility and value of the invention he had brought under their notice. Meanwhile, Schoeffer, his late co-worker, continued the work in Mainz, and issued the Mainz Psalter and other meritorious examples of printing, all of which will bear comparison with many modern works.

There is an account at the end of one of Livy's works of what purports to be a privilege granted to Schoeffer by the Emperor Maximilian, of the exclusive right of publishing that author's works for a period of ten years, as well as other concessions bestowed, out of consideration for various improvements in the art of printing.

Type faces were brought to a much higher perfection, in point of usefulness, by Schoeffer during his connection with Faust. As already noticed, his abilities, backed up by his patron, Faust, enabled him to effect many improvements which greatly curtailed the labour of the press.

Contemporary with Schoeffer there were other rival craftsmen, who introduced many devices to adapt the art and bring it into requisition as a

commercial factor in everyday life. Although Schoeffer had vastly improved upon Gutenberg's method, he, in turn, had been superseded by others possessing the skill and ability necessary to make its use become more general.

Among the numerous printers who seemed to have sprung up throughout Germany, one or two names (in addition to the more conspicuous ones already mentioned) call for some special notice:—

Sensenschmidt, in 1470, was one of the most prolific, as well as one of the most important typographers, and was the first to introduce the craft into Nuremberg. His publications include an edition of the German Bible.

Zainer, a craftsman of some distinction, brought out an excellent edition of Æsop's Fables, at Ulm, in 1477. It was speedily copied in most of the large towns of Germany.

Prüss (1484), of Strasburg, made a speciality of printing theological and scholastic books.

Schönsperger, the elder (1514), printed a Prayer Book intended for the private use of the Emperor Maximilian, by whom it was probably arranged. He also printed, in 1517, an Allegorical Poem, written by Pfintzing, perhaps with the help of Maximilian, on the occasion of the Emperor's marriage with Mary of Burgundy. Both of these examples of Schönsperger's press are to be seen in the British Museum, and are unique specimens of fine typographical work, printed in red and black, in bold characters, and cleverly illustrated.

Affairs never, at any time, ran smoothly for long together with these early pioneers; they were too often the objects of hatred and jealousy of those who had more reason to befriend them, and not least by the monks and priests, who

attributed to them demoniacal possession. But it is an ill wind that blows no one any good. The war between the two rival archbishops of Mainz (though causing a temporary lull in the spread of typography in the city for the space of two years, hence no books are known with the dates 1463-4) was, however, after the sacking of the city by Adolphus, the means of scattering the craft all over Europe, etc. Following upon this dispersal, printing presses were set up in Bologna (Italy), 1462; Paris, probably 1464; Russia, 1465; Rome, 1466; the Netherlands, 1473; Spain, 1475; Brussels, 1476; Constantinople, 1490; and, as some think, in England in 1462, but more generally regarded as 1471-4. The art was not introduced into Sweden and Norway until about 1500.

Sweynheim and Pannartz were two Italian printers who have given us some very fine examples of typographical work. Mention should, however, be made of one book entitled "Lactantius." It is printed in the Gothic character, with the Greek quotations introduced into the text, in red ink, bearing the date 1465—said to be the first book having a precise date. Altogether it is a remarkable production.

At Basle, in 1491, Joannes Frobenius started a printing office, which became famous by reason of the correctness of its publications (some 300 in all). Much of the fame of this press was due to its connection with Erasmus, the eminent scholar, who acted as "corrector," and superintended the publication of many of his own writings.

Venice was one of the earliest settlements, and has produced some of the best printers. The first book was issued in 1469 by Joannes de Spira, who obtained a monopoly for five years, but died

early in 1470, being succeeded by his brother Wendelin, to whom the privilege did not apply; Nicholas Jenson, also a well-known craftsman, followed De Spira, in 1470. He was for some time Master of the Mint at Tours, and was one of the most celebrated of the many Venetian printers. Aldus Manutius followed Jenson in 1488. He also obtained distinction, not only for the valuable additions to the printing art brought about by his inventive genius, but also by his scholarly ability, which enabled him to publish so many of the works of the old Greek and Latin authors. In addition to his own acquaintance with Greek, he was fortunately assisted in many of his publications by the renowned Erasmus.

This press was commonly known as the Aldine press, and was distinguished by the device of a dolphin and anchor, which Aldus printed on most of his books. So enthusiastic and energetic was this Venetian printer that he could find no time for anything outside of his occupation. In writing to a friend, several years after the setting up of his press, he said, speaking of the time since his commencement, he had "never enjoyed one hour of sound sleep;" and later he remarked on the stress of his "terribly severe occupation." Aldus was on the greatest terms of intimacy with the Italian prince, Alberto Pio, who also shared his taste for literature. The following inscription, placed over the door of the printing office of Aldus in Venice, is somewhat characteristic of the man—"Whoever you are, Aldus earnestly entreats you to despatch your business as soon as possible, and then depart; unless you come hither like another Hercules, to lend him some friendly assistance; for here will be work sufficient to employ you, and as many as

enter this place." Although the work of the Aldine press was generally plentiful, there have been times of great depression.

Aldus attempted some alteration in punctuation marks. The oblique stroke which served for a comma he formed into a better shape, and also added the semi-colon.

Aldus died in 1515, at the comparatively early age of 69, and was succeeded by his son, Paul, who was also an enthusiast in the study of literature. The printing office continued for a long time to be one of the foremost in Europe.

Niccolo Malermi brought out the first illustrated Italian Bible. It contains upwards of 400 small woodcuts, illustrating the chief biblical events, many of which were adapted from pictures of the Cologne Low German Bible of about 1480.

The date of the first book printed in France is doubtful, but in the records of the earliest craftsmen we find, in Lyons, that of Le Roy, who was the first to set up a press in that city, in the year 1473; in Paris, Du Pré (1486) and Philippe Pigouchet (1491). The well-known firm of Stephens was established in Paris at the beginning of the Sixteenth Century, and was continued by Stephens' descendants well into the following century. They enjoyed great reputation for accuracy and style, as well as for the beauty of the type faces they used. Printing was introduced into Rouen not later than 1487 by Guillaume le Talleur, who printed three law books for Richard Pynson, of London, in 1491. Besides Pynson, Le Talleur also printed a Sarum Missal and other books for the use of English readers.

At Bruges, in 1476, Colard Mansion, a calligrapher, took up printing, and used a type in

imitation of his own handwriting. Misfortune compelled him to flee from the city to avoid imprisonment for debt, and Mansion left his printing materials behind him.

The first book printed in the new world is given variously by different writers, but generally thought to be 1536. This work was known as the Bay Psalm Book—a very popular book at that time. It was last issued in 1754, which made the seventieth edition, but fully half of these, however, were printed in Great Britain.

Samuel Green and Marmaduke Johnson printed the first American Bible, compiled by John Eliot, at Cambridge, Massachusetts, in 1661-2.

In the middle of the Sixteenth Century we find traces of the craft having found its way as far north as Iceland, and also to certain parts of the coast of Africa.

In Japan, a century ago printing was unknown; to-day it is admitted that the Japanese are the most progressive of the Eastern nations. Their capacity for assimilating Western ideas is evident by the many institutions that have but recently grown up all over Japan. They have shown rare judgment and a fine appreciation of detail in appropriating the very best of our civilization to their own use. In this respect their printing establishments compare favourably with the most replete of any in the Western world. They are models of completeness, for the simple reason that money and time, for many years, have been spent in investigating in order to obtain the best; and the astuteness of the Japs in their commercial as in their national developments, is not the least characteristic of their many traits, as recent events have well demonstrated.

In 1517 some enterprising Jews opened a Hebrew printing office in Constantinople, and produced the apocryphal Book of Tobias (unpunctuated). This publication so enraged the caligraphists (who were very largely employed) that they entirely demolished the plant. The Sultan was no less alarmed at the invention, and strongly favoured the cause of the writers. The Venetians, upon their own initiative, presented His Majesty with a completely equipped printing office, but his suspicions, coupled with his Mohammedan notions, compelled him to part company with it, which he did by pitching it into the waters of the Bosphorus.

It is interesting to notice on another occasion how an Englishman attempted an innovation by printing the Koran, and offering it for sale in the thoroughfares of the city. The effect of this outrage on the susceptible mind of Mohammed's followers was alarming. A general uproar resulted, accompanied with indignation and protest, followed by the Sultan hastily buying up every copy that could be found and throwing them also into the sea, at the same time threatening all who dared to introduce it again into his dominions, and stigmatizing the art as *useless*. As most of Mohammed's followers hold that the Koran must be a written book, they would naturally have an aversion to everything printed. It was not, however, until after the year 1730 that printing could be said to flourish in the Ottoman Empire, as from that date it began to enjoy a measure of patronage from the Sultan, but this only to a very limited extent. He had an inherent dislike to the printing press and to literature generally, and very little urging

was needed for him to checkmate the zeal of these would-be reformers. Printing offices even to-day are rigidly kept under official surveillance, and the State steps in as a medium through whom supplies for carrying out the work must be obtained.

It is a noteworthy fact that from the first the Jewish race who settled in Turkey have been most persistent in propagating the printing art. They have, notwithstanding a rigid censorship, issued many of the books of the Old Testament and other important publications, not only in Turkey, but in several other European countries.

In the British Museum there are 2000 volumes alone in Hebrew character, printed in various parts of Europe largely by Jewish efforts, a fact which shows how eagerly this people have espoused the profession.

It is necessary, before leaving this section, to speak of one of the most prominent and widely known European craftsmen, viz.: Christopher Plantin (born in 1514). Previous to removing to Antwerp, in 1555, he carried on business for some time in Paris, but having settled and established himself in the former city, with every convenience, he soon began to issue books in various languages. He was, however, accused of printing an heretical Prayer Book, and had to take refuge in France, during which time his office and appliances were sold up. He came back eventually under the patronage of the King of Spain, and from that time seems to have established himself securely with the enjoyment of the monopoly of printing of the State and ecclesiastical books used in Spain. Under such auspices he acquired, at immense cost, large and

handsome buildings, now universally known as the Musée Plantin.

Plantin was also appointed Printer to Leyden University; however, very soon after his fresh start the greater part of his office was wrecked in the siege and fury of the Spaniards which broke over the city in 1576. Plantin had repeatedly to pay ransom to save his office, but eventually came out somewhat reduced and much crushed by the fearful ordeal. Indeed it may be said that Antwerp itself has never recovered from this blow.

Among Plantin's numerous publications, his Polyglot Bible of eight folio volumes, published in 1569-72, is a really marvellous production, combining learning and excellency of workmanship, and remains to-day a book greatly admired.

Plantin died in 1589, and was buried in the cathedral of that city. John Moretus, his trusted manager, after his death successfully carried on the business, and it remained in the same family until 1867, when the business came to an end. It has now been acquired by the nation as a museum, and still remains intact as an object of wonder and interest to many, beyond those usually interested, as an old-time printery, interwoven so remarkably with such stirring events of history.

Among other celebrated printers mention should be made of Abraham Elzevir (Holland), born in Leyden in 1592. Baillet describes him as "the Prince of Printers, not only in Holland, but throughout all Europe." Elzevir and his descendants were responsible for the printing of a great number of excellent books. Small editions of the Classics were issued in different sizes. These

books met with great popularity on account of their cheapness and the excellency of the type used, and to-day are much sought after by book fanciers.

Most of the ancient manuscripts had found their way into print by the early part of the Sixteenth Century, and to this fact the ultimate revival of learning throughout Europe, and the spread of greater taste for literature, is very largely due.

Luckombe refers, in his preface, to the attitude of the Church to the printing press, quoting Cardinal Wolsey. After speaking of the discovery of printing as contributing greatly to the production of learned men in Europe, the Cardinal stated the effects of this art to the Pope thus: "That his holiness could not be ignorant what diverse effects this new invention of printing had produced; for it had brought in and restored books and learning, so together it had been the occasion of those sects and schisms which daily appeared in the world, but chiefly in Germany, where men begin now to call in question the present faith and tenets of the Church, and to examine how far religion is departed from its primitive institution. . . . Since printing could not be put down it was best to set up learning against learning; and by introducing able persons to dispute, to suspend the laity between fear and controversy. This at worst would yet make them attentive to their superiors and teachers." Such opposition to the printing press, instead of retarding its progress, has helped to extend its influence for good in every direction.

Benjamin Franklin, the distinguished American philosopher and statesman, is often referred to as

one of the most successful of transatlantic typographers. He was born at Boston, U.S., in 1706, but learned his trade as a printer in the office of Samuel Palmer, in London (1724), and rapidly made headway in the profession. He also became a very clever and successful journalist. Franklin placed his sole reliance, as a means to success, upon his indomitable, persevering industry; and a study of his life will best answer as to the full realization of this high ideal. From the year 1732, we are told, his prosperity began. Soon after he married he commenced as a newspaper proprietor, and further added to his rôle the duties of editor. Among his many occupations in London he found time to carry on a shop, cast his own type, and even find leisure to pursue scientific study, which led to many discoveries. Franklin became likewise successful as a statesman in his own country, and represented the United States for some time as Ambassador to the Court of France, returning to America in 1785.

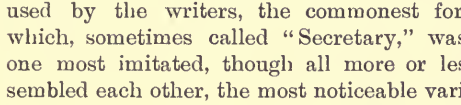
His proverbs are very apt illustrations of his philosophic and ingenious mind.

Franklin died in Philadelphia, in 1790, and the press at which he worked in England, in his early days, is carefully preserved as a relic in the Smithsonian Institute in Washington.

IV.

Gothic and Roman Types—Caxton and the Introduction of Typography into England—Notable English Printers—Fifteenth Century Punctuation—Progress of the Art in the United Kingdom.

IT is remarkable how tenaciously the early printers, particularly on the Continent, adhered to the Black (more generally known as Gothic) letter in most of their publications. It was the survival of the style used by the writers, the commonest form of which, sometimes called "Secretary," was the one most imitated, though all more or less resembled each other, the most noticeable variation



Gothic character used in early printed books.

being in the design or form of the capital letters. The practice was not common to the German craftsmen only; many in Italy, France, Spain, and other European countries, following the prevailing fashion as a matter of interest rather than from any idea of choice. Frequent attempts were made, in Paris, to introduce the Roman character, but were resisted by the prejudices and inclinations of those who were strongly predis-

posed to maintain the imitated character of the monkish writings, which were regarded with so much veneration. The same may be said of the first introduction of printing types into England, distinguished by the name of "Monkish-English," the parents of our present "Old English," or Black Letters. Caxton's Black, used so much in his various books, is no improvement on the usual Gothic style. It was a letter, however, that found its way into many offices in Great Britain, and has continued to be used down to the present day, though, of course, cast with more perfect alignment.

It was no uncommon thing in England, in the Seventeenth Century, that among other qualifications required of schoolmasters, was the ability to write a good "Secretary" and a good "Roman" hand.

In the nature of things printing from type was bound, sooner or later, to supersede the tedious and costly writing of books by hand, perfect and beautiful though they were, both in printing and embellishment; the time occupied was the greatest objection

The opposition to the continuance of the Gothic style soon wore down, for we find a modified form of Gothic introduced, and very shortly after came the general adoption of the more legible Roman characters, although a great many of the Germau and Dutch printers have continued to use the Gothic even to the present day. It is worthy of note that Prince Bismarck had a very marked preference for the old form of lettering, while on the other hand the Kaiser strongly favours the Roman character.

The monuments of Richard II., and other notables, erected in Westminster Abbey, date about

1400, bear inscriptions which are considered perfect designs of Gothic style.

A few years after the introduction of printing into England, Sweynheim and Pannartz, two of the most successful of Italian typographers, brought out their edition of "St Augustan on the City of God," printed 1467, in the Roman letter.

Diſcuſſion ryſyng on thiſwyſe

Roman Type.

Kepte rulis bothe in Engliſhe

Italic Type.

These many fine poynts

"Black" Type.

Cast from original matrices, struck from Caslon's punches (about 1720).

This is said to be the first work issued in this new style. The Roman types of that early period were not unlike those of the present day, perhaps more rudely shaped in some respects than those of modern use, but essentially they were the same. These type faces were greatly improved upon by Nicholas Jenson, in Venice, who, in 1470, was sent to Mainz by Louis XI. to acquire a thorough acquaintance with the art of printing in that city. He eventually returned to Venice and established his press, and obtained distinction for the excellency of his printing as well as for the beauty of his type. These faces were in great request by the early printers of Rome, to whom he supplied them.

Type now known by the name of Italic was invented by the Venetian printer, Aldus Manutius,

in the year 1500. It was cut by a certain Francesco de Bologna, and was first called "Venetian," from the inventor being a resident in Venice, but the name was afterwards changed to that already mentioned. It was dedicated to the State of Italy, to avoid disputes likely to arise from any other country claiming its origination, as was the case with the first inventor of printing. The type is said to be an imitation of the handwriting of Petrarch, and was chiefly used for the smaller editions of the Classics, but without its own capitals, in the place of which were used the usual Roman characters. Italic type first appeared in an edition of Virgil (1500), and was very quickly copied by other printers. Copies of both the original and the imitated books, showing the variation of type, are to be seen in the British Museum.

Greek type was first introduced by Schoeffer in his edition of Cicero's "De Officiis," about 1465; and also used by Sweynheim and Pannartz in the same year. Hebrew type was first used in the publication of the Pentateuch, printed in Switzerland, in 1482; and later, from the same press, a Polyglot Bible was issued—comprising Hebrew, Arabic, Chaldaic, Greek, and Latin.

The art of printing was first introduced into England by William Caxton, who set up his press in the Almonry of Westminster, at the sign of "The Red Pale," sometime between 1471 and 1474. He was a man possessed of good sense and sound judgment, bold and fearless in character, and withal tactful and industrious; full of enthusiasm for the craft he had espoused, and towards which he acted as England's pioneer. He seems to stand out conspicuously as a great

personal force in an otherwise dark and stagnant age, when learning was at a low ebb; and by his energy — not only by the introduction of printing, to which he had devoted so much study in order to perfect his knowledge—but also as a translator and author, we know how well he served his day and generation by the emancipation of his countrymen from the fetters of that intellectual and moral ignorance, which then bound men like slaves. He was an epoch-maker, and one of the most pronounced type; his cultured mind, by reason of his superior education, had given him a sense of the need of his country, then suffering acutely from the effects of those civil commotions and turbulent outbreaks which have become a matter of history, and which he endeavoured to allay by the diffusion of knowledge. Caxton deplored the indifference of the people to education and the obvious disadvantage under which they laboured. His study and residence abroad for so long had enabled him to observe the various Continental systems, and to devise means to bring about some alteration.

Caxton was born in the Weald of Kent about the year 1412, but of the exact place we have no certain knowledge, nor of the rank and employment of his parents, who, however, seem to have given him a thorough education—a circumstance very unusual at that time, except among the most wealthy classes. "I lerned myn englissh in Kente," says Caxton, "in the weeld, where I doubt not is spoken as brode and rode englissh as in ony place of England." The inhabitants of the Weald of Kent had a very strong admixture of Flemish blood in their veins. Caxton observes, in speaking of his parents' duty towards him—"I

am bounden to pray for my father's and mother's souls, that in my youth sent me to school, by which, by the sufferance of God, I get my living I hope truly."

At the age of about fifteen he was placed as apprentice to Robert Large, an influential mercer, who was successively High Sheriff and Lord Mayor of London. At the expiration of his apprenticeship he took up the freedom of the Mercers' Company, and became a citizen of London. The term "mercer" at that time generally applied to traders in all kinds of merchandise, and, of course, included books. At the decease of Robert Large, in 1441, Caxton was left in his will a small legacy of twenty marks (considered a good sum at that time)—a circumstance which seems to show that he conducted himself, while an apprentice, to the satisfaction of his master. He afterwards left to travel on the Continent, but in 1464 we read of his being appointed, with one named Richard Whitehill, a kind of joint Envoy to the Court of the Duke of Burgundy to negotiate terms for a new Commercial Treaty. Caxton was commissioned to this high office at the instigation of King Edward IV., and it was during this stay that he became acquainted with the unfortunate Earl Rivers. Caxton took advantage of his residence abroad and applied himself ardently to study, acquiring a greater hold of the French language, which enabled him, at the request of the Duchess of Burgundy, to complete his translation of the "Recuyell of the Historyes of Troye," which was printed at Ghent, in 1471. It was the first book printed in the English language, and was an object of great interest, hence its sale was rapid. The

width was five inches, it was thirty-one lines in length (the lines not being spaced out), and the book bore neither date nor signature. Finding this latter expedient was followed by other printers, he afterwards adopted the same style in his future

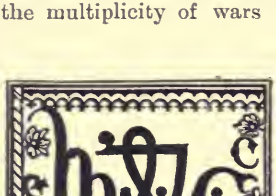
William Caxton.

publications. The book was also devoid of a title-page, as was customary at that time—an omission which he was careful to remedy in his later productions. Further, we find that he applied himself to a thorough theoretical study of typography, and spared no expense in adding to his

knowledge of the craft. His efforts were not attained without some difficulty, for the secrets of the "mysterious" art were, by many, still jealously guarded. Caxton visited the metropolis of the craft, viz., Mainz, besides visiting the presses of Cologne, Bruges, and other places, and finally returned to England in the year 1471. He brought over from Flanders his first printing press and outfit, and, as already mentioned, set up his office in the Almonry of Westminster, at the sign of "The Red Pale." The Abbot of Westminster was one of Caxton's most enthusiastic patrons, and often attended his printing office to revise or correct the different religious publications brought out by him. In those days the Abbot exercised great ecclesiastical influence, with immense privileges connected with his position in the Abbey and in Parliament, but the Reformation soon followed in the wake of the printing press, accelerated largely by this new means, and much of the ecclesiastical power of the Abbey was swept away, including the Abbot himself.

Caxton was joined by his father, at a time when his fame was at its height. They laboured together with enthusiasm, and the output of their efforts, together with the help of Wynkyn de Worde and Richard Pynson, two imported craftsmen, was prodigious. Caxton was a man who thoroughly believed in work, in order, he tells us on one occasion, "to eschewe slouthe and ydelness, whyche is moder and nowrysshar of vyces." His admiration came from those in the humbler as well as those in the learned and higher ranks of life. Many flocked to behold and admire the work of his press, while Edward IV. and other members of the Royal house, besides Richard

of Gloucester, Earl Rivers, the Duke of Clarence, and the Abbot of Westminster, were among his numerous patrons and admirers. The King took special interest in the work of Caxton's press, and many beautiful impressions were produced in His Majesty's presence. In spite of this monarch's unhappy and depressing reign, he was accomplished and learned sufficiently to appreciate the immense advantages of the introduction of the printing press into this country, and found time, amid the multiplicity of wars and selfish



Colophon of William Caxton.

propensities, to extend to Caxton much goodly support. How different things would have been in the Continent had the early craftsmen there received a like encouragement! The high esteem in which the King held the printers' craft so exalted the prestige of those craftsmen in England that printers were created Gentlemen, and were also entitled to wear side arms.

The productions of his press amounted to nearly 00, besides the translations of various works, the most noteworthy being Virgil's Æneid, already mentioned, and Æsop's Fables, a copy of which

is in the Bodleian Library at Oxford. He experienced at one time doubt as to the style of language used in his publications. While some advised him to adopt the most simple phraseology he could find, others, "honest and great clerks," he adds, "have been with me, and desired me to write the most curious terms I could find—thus, betwixt, plain, rude, and curious, I stand abashed." He published his first book, printed in England, in 1474, entitled "The Game and Playe of the Chesse." Some authorities give his book called "Dictes and Sayinges of the Philosophers" as his first production. It was, at any rate, the earliest book having an imprint, which runs as follows: "Empryuted by me, William Caxton, at Westmestre, 1477." In 1480 his "Chronicle" and his "Description of Britain" were published, both of which books were popular, and were reprinted many times. He also published two editions of Chaucer's "Canterbury Tales," a fact which seems to show how much is due to these two early English fathers for the subsequent fixity of our English language.

Caxton's "Mirror of the World," published in 1481, was the first English book illustrated with modern wood engravings. A copy was recently sold for £350.

The Osterley Park copy of "The Game and Playe of the Chesse" realized the sum of £1950, and the first edition of the "Dictes and Sayinges of the Philosophers" was sold in 1897 for £1320.

Caxton died in 1491, greatly lamented by his countrymen, and truly "he deserved well of posterity." He was buried at the Church of St. Margaret's, Westminster, and in the registers of that parish it is thus recorded:

1491.

Item, atte bureying of William Caxton,
for iiii. torches . . . . . vis. viii*d.*

Item, for the belle atte same bureying . vi*d.*

A memorial tablet is erected to his memory in St. Margaret's Church, Westminster, and also a monument, erected in 1820, at the instance of the Roxburghe Club, bearing the following inscription: "To the Memory of William Caxton, who first introduced into Great Britain the Art of Printing, and who, A.D. 1477, or earlier, exercised that Art in the Abbey of Westminster, this Tablet, in remembrance of one to whom the Literature of this country is so largely indebted, was raised Anno Domini MDCCCXX. by the Roxburghe Club. Earl Spencer, K.G., President." Quite recently a handsome stained-glass memorial window has also been erected in the same building. This memorial, in addition to a representation of the Printer and his work, contains figures of the Venerable Bede and Erasmus—the former as a compiler of English history, and the latter as a corrector of the press.

The Printer and his work was fittingly celebrated in 1877 by a Caxton Exhibition, held in London.

The printed books of Caxton were distinguished by a particular device, as seen on his colophon, consisting of the initial letters of his name, with a cipher between.

Caxton's first typographical efforts were, as understood, somewhat crude in arrangement, and, compared with the early English manuscripts, which they pretended to imitate, were inferior in everything but cost. The letters appeared to overlap each other, more after the manner of an

engraving, and the leaves or pages had no distinctive numbers until a later period. It was usual, at the beginning of chapters, to insert a small letter to denote where the initial had to be put in by the illuminator. Title-pages came into use just before Caxton's death. Their adoption was no doubt suggested by the heavy metallic and other forms of book covers so much in vogue then, which precluded the title of the book always appearing on the outside.

The first English poster was issued by Caxton, a copy of which is preserved in the Bodleian Library at Oxford; it contains a description of a service book, which was then on sale at Westminster.

Doubts were expressed as to Caxton's having introduced the art into England. These were based upon the discovery of a book about 200 years after his death, at Oxford, said to have been printed in the year 1468, three years before the commencement of Caxton's labours at his press in Westminster. The literary world was agitated for a time, but the result of the disputation appeared to show that Caxton was undoubtedly the first to print from metal types in England, and that a printer, named Corsellis, from Haarlem, also had previously printed with wooden types at Oxford.

It is remarkable that Caxton, with all his zeal and thoroughness in business, should have permitted so many errors to creep into some of his publications. The unsightly marks caused by the space lines rising in the working of the press formes were rendered still more objectionable by his having made red pencil corrections on the printed sheet. However we may praise the work and progress of Caxton's craftsmanship, it is sur-

prising to find him at times violating the most elementary rules in simple forms of punctuation and division of words, which obtained at least some slight justifiable use, since the better known writers had previously used them in their books. Too much attention seems to have been bestowed on the printed matter after it had left the press, instead of revising before printing. Some excuse may be made in mitigation, if we compare the primitive means and material at his disposal with the better facilities afforded his successors. It does not appear to have suggested itself to Caxton to have recourse to scholarly men to supervise his various publications, as was commonly done on the Continent, hence results in English printing were lacking in that finish and correctness which compared unfavourably with those printed in Germany and the Netherlands.

Caxton addresses some observations to the reader on the translating of a Dutch work into English, thus: "Prayeng alle them that shal see this lytyl treatis to correcte and amende where they shal fynde faute."

In most of the printed works of Caxton there is a mark used for punctuation very similar in appearance to a shilling stroke. It is used to denote the comma, and is frequently met with in other books printed after Caxton's time.

The two most distinguished successors of Caxton were Wynkyn de Worde (probably a fugitive printer from Mainz) and Richard Pynson, both serving under Caxton until his death. The former was a native of Lorraine. He succeeded Caxton in the capacity of King's Printer, in 1491, at the sign of "The Red Pale," and made very rapid strides in the art.

Wynkyn de Worde enjoyed extensive patronage, and produced many excellent publications. In 1493 he issued "The lyf of saint Katherine of Senis," and in the following year printed a book, by Walter Hylton, entitled "Scala Perfectionis," both executed in Caxton's type. The author dedicates the work to Margaret, Countess of Richmond. In some later books, during King Henry VIII.'s time, Wynkyn de Worde frequently styles himself printer "unto the most excellent princess my lady the king's grandame."

Colophon of Wynkyn de Worde.

One of his most important publications was the "Voyages and Travels of Sir John Maundeville," in 1499. Soon after this date he removed from Westminster, and was "dwellynge in flete strete at the sygne of the sonne agaynst the condyth"—"The Sun," in Fleet Street.

Wynkyn de Worde was also printer of numerous books for Whittinton, from 1512 onwards, chiefly grammatical works, and in 1521 he executed for the same author thirteen different volumes. He was an enthusiastic printer, and issued in all some 400 works. On most of these he printed a similar device, or colophon, as did Caxton.

In 1509 Wynkyn de Worde added to his imprint the statement that he was printer to the King's mother, the Lady Margaret.

It is believed by some that Wynkyn de Worde first introduced the round Roman letters of Sweynheim and Pannartz into England. However, it is certain that Pynson, in 1518, printed a book entirely in the Roman character. Wynkyn de Worde is also credited with being the first printer of music in Great Britain, A.D., 1495, and the first English printer to use Greek type.

He died in 1534.

Pynson was a native of Normandy. How long he practised the art, or when he died, are not exactly known. His works, however, do not come up to the excellency attained by Wynkyn de Worde. In his first production, printed with a date, it is stated that it was printed "the V day of Juyl. the yere of oure Lord God. M.CCCC.LXXXX (?) by me Richard Pynson at the Temple-barre of london," where he had set up his business outside the city boundary. One of the finest productions of his press is a work entitled "Manuale ad usum insignis ecclesiæ," printed in red and black, on fine vellum. A copy of this book is preserved in the British Museum. Pynson also styled himself the "King's Printer."

Among the numerous craftsmen who arose in London and different parts of the country about this time, mention should be made of the following: William Copeland (who was for a time employed by Wynkyn de Worde), Wolfe, William Faques, Thomas Berthelet, Richard Grafton, Edward Whitchurch, and others, copies of whose printed books are still to be found.

A somewhat prolific typographer arose about

the time of the Reformation, named John Day. He utilised the printing press as a means of publishing attacks upon the intolerance of the ecclesiastical power of that time. No doubt this was one of the chief reasons that induced the Government to interfere and place the press under heavy strictures, ostensibly to put an end to treasonable and heretical publications. The freedom and honour of the early days of the art in Great Britain were succeeded by a period of petty interference and curtailment of liberty.

A good deal of persecution followed upon the publication, at one time, of some Puritan papers, known as the Marprelate Tracts. They were prose satires upon the ecclesiasticism of the days of Queen Elizabeth, and the authorities, acting under the Bishop's instructions, were very keen to find the authors and printers. However, the press was fugitive, for under cover of night it was secretly removed from place to place to escape detection, at the same time continuing to issue its satirical publications.

An attempt was made in the time of Wynkyn de Worde to systematize an improved method of punctuation. In a work said to have been printed by him we extract the following:

"Of the Crafte of Poynting.

"Therbe fiue maner pontys, diuisions most usid, with cunnyng men: the which, if they be wel usid, make the sentens very light and esy to understond both to the reder and the herer, and they be these: *virgil*, *come*, *parenthesis*, *playne poynt*, and *interrogatif*. A *virgil* is a sclender stryke: lenynge forwarde thiswyse, betokynynge a lytyl, short rest without any perfetnes yet of sentens: as betwene the fiue

poyntis afore rehersid. A *come* is with tway titils thiswyse: betokynynge a longer rest: and the sentens yet ether is imperfet: or els if it be perfet: ther cumeth more after, longyng to it: the which more comynly cannot be perfet by itself withoute at the leste summat of it: that goethe afore. A *parenthesis* is with tway crokyd virgils: as an olde mone and a new, bely to bely: the which be set theton afore the begynyng, and the tother after the latyr ende of a clause: comyng within an other clause: that may be perfet: thof the clause, so comynge betwene: wer awey and therfor it is soundyde comynly a note lower, than the uther clause. If the sentens cannot be perfet withoute the ynner clause, then stede of the first crokyde *virgil* a streght *virgil* wol do very wel: and stede of the later must needis be a *come*. A *playne poynt* is with won titil thiswyse . and it cumeth after the ende of al the whole sentens, betokynynge a longe reste. An *interrogatif* is with tway titils: the upper rysyng thiswyse ? and it cumeth after the ende of a whole reson: wheryn ther is sum question axside, the whiche ende of the reson, trying as it were for an answare: ryseth upwarde. We have made these rulis in englisshe: by cause they be as profitable, and necessary to be kepte in every mother tunge, as in latyn. Sethyn we (as we wolde to god: every precher wolde do) haue kepte owre rulis bothe in owre englisshe, and latyn: what nede we, sethyn owre owne be sufficient unongh: to put any other exemplis."

Towards the middle of the Sixteenth Century the art had become a flourishing industry. This

successful state of things continued, from the time of Henry VII., through a long period of some of the most striking phases of English history.

We have already remarked upon the first Royal Printer and his successors, Wynkyn de Worde and Richard Pynson. It is, however, interesting to note that this ancient and responsible office has only been conferred on thirty-four persons. The firm who are at present holders of this royal privilege, Eyre and Spottiswoode, originated with the Baskett family, the royal patent being renewed to them in 1739. Robert Baskett was followed by Charles Eyre, the great-grandfather of the present Mr. Briscoe Eyre. Not being a practical printer, he enlisted the co-operation of William Strahan. Andrew Strahan succeeded William, and he was followed by his nephew, Andrew Spottiswoode, whose son and successor to the business, William Spottiswoode, became a very honoured President of the Royal Society. He was also a man of some literary attainment, and a clever mathematician. His remains were interred in Westminster Abbey in 1883.

The present firm, as King's Printers, continue the right of printing the Prayer Book of the Established Church, as well as numerous editions of the Bible.

From a very early date Oxford seems to have adopted the advantages of typography, due, no doubt, to the fact of its being a centre of learning, and a depository for most of the English and many of the foreign manuscripts, which eventually found their way into print.

Theodoric Rood, a native of Cologne, in conjunction with Thomas Hunte, an Englishman, set up a printing office in 1480, and issued many

fine books, but it would be difficult to say how long they survived. Mr. Anthony Wood, in his "History of the Antiquities of Oxford," printed

Old Printing Office.

in 1674, mentions that Theodoric Rood was succeeded by Scolar in 1518. It is thought that, in the meantime, Wynkyn de Worde, and probably

Pynson, did a good deal of the work of printing for the University.

Scolar, in a book he printed at Oxford, speaks of an edict of the Chancellor of the University prohibiting the printing and selling of that book for a period of seven years. During the censorship of the press throughout England, the Vice-Chancellor was deputed licenser of all books printed at the University.

Henry Crutterdon, in 1688, printed a book at Oxford, wherein he styles himself one of His Majesty's printers.

Previous to this date, viz., 1635, Archbishop Laud obtained an important license with a view to publishing the valuable Bodleian Manuscripts on behalf of the University.

The control of the printing department of the University Press—or the Clarendon Press, as it is now called—is managed by a Vice-Chancellor and ten members of Convocation. The building comprises—the North side, for the classical publications of the University, books, and documents; and the South side, for printing Bibles and Prayer Books.

The Universities of Oxford and Cambridge, as also the King's Printers, enjoy a vested right in printing the Bible. It is thought, however, that Cambridge first undertook the work. The Oxford edition nowadays is somewhat unique, for the Press at the University manufactures everything required in its publication—paper, type, ink, and the preparation of leather, etc., used in the binding. They also employ a large number of workpeople. The total Bibles issued by this Press number a million copies yearly.

Siberch set up a press at Cambridge in 1521,

and spoke of himself as the first Greek printer in England.

The University, however, has had a printer since 1582; but the press as now existing was completed in 1833. Although it has a large output, it by no means equals the sister University of Oxford.

St. Albans was a very important town during the pioneer days of the printing press in England, and a great number of works were printed there, about 1480, by an unknown craftsman, who styled himself the "Schoolmaster-Printer." Many of his books are to be seen in the British Museum.

The earliest printing press at Canterbury was conducted by the monks; while that at York was set up by Hugh Goes, a somewhat noted printer, about the year 1509.

Ipswich was a large and important centre, and had its printing press during the time of Cardinal Wolsey's School, which he established there in 1524, but he had recourse to continental printers for what he required.

We have no definite record of date when printing was introduced into Wales, but in the celebrated Martin Marprelate Tracts mention is made of one named Thackwell as follows: — "Knave Thackwell, the printer, which printed popishe and trayterous welshe bookes in wales."

A Welsh minister, named Rev. Walter Cradock, was instrumental in getting the New Testament translated and printed in Welsh, two editions being published in 1646 and 1647; and ten editions of the entire Bible were issued in the same language up to the year 1690. Cradock was selected as one of Cromwell's "tryers" during the Commonwealth, and previously had been ejected from

two curacies in the Principality for his lax support of the Established Church of that day.

In Scotland it is necessary to obtain a special licence to print the Bible. James IV. granted a privilege or patent to two printers, named Walter Chapman and Andro Myllar, in Edinburgh, in the beginning of the Sixteenth Century.

It was said that the printers of Edinburgh were always "agin the Government," whatever party were in power. However, it was an easy matter to give irritation to the authorities at the time of the Rebellion of 1745, and in consequence the press were subjected to some rough handling. Ged and the younger Ruddiman suffered severely for their Jacobite principles, and severer still was the treatment meted out to one named Robert Drummond, a well-known craftsman of Edinburgh, who published a satirical poem. The satire had reference to the trial and acquittal of Archibald Stewart, Lord Provost of Edinburgh, and his lack of effort against the rebels when they seized possession of the city. This prosecution was viewed as a somewhat severe measure by those who favoured the Stuart cause. In the poem were left a number of blanks and initials, intended to be filled up by the reader. It dwelt strongly upon the cruelties perpetrated after the Rebellion up to the trial of Provost Stewart, and directed also against the Duke of Cumberland and others, who were believed to be instrumental in bringing about the said trial. Copies of the publication were seized, and Robert Drummond was accused of printing and publishing the same. He was found guilty and "ordained to be carried to prison, and thence, on the 25th November, betwixt the hours of twelve and one, to the Cross of

Edinburgh, there to stand bareheaded, with a label on his breast, inscribed thus—'for printing and publishing a false, scandalous, and defamatory libel,' till all the copies seized of the poem should be burnt by the hangman; then to be in prison till he should give bond to remove out of the city and liberties, and not return for a year, on payment of a £100 sterling, and suffering imprisonment till the remainder of the year was run, and to be deprived of the privileges of a freeman for a year." A fruitless appeal was made to the Court of Justiciary to alter this sentence, and Drummond was accordingly brought to the Cross and the copies burnt in his presence, and then ruthlessly taken back to prison. (*Scots Magazine*, 1747.)

Not long after his release he returned to the city, but he was again seized by order of the Magistrates for another publication which aroused their indignation. His types, material, and copies of the print (which was entitled "The King of Prussia's Letter to His Royal Highness Prince Charles") were seized, and he himself lodged in prison.

He was dragged again, on a third occasion, from his hiding-place, and brought before the Magistrates for daring to publish an "Exposition of the Commandments," which the powers suspected was favourable to the Popish Faith, but afterwards liberated on the physician certifying that he was broken in health. He did not long survive his release.

At Glasgow, in the year 1638, we have a rather interesting record of the introduction of the art in the Scottish metropolis, whence it had been conveyed from Edinburgh.

In the records of the Glasgow Town Council it is thus recorded:—

"4 Jan., 1640. The said day ordaines the treasurer to pay to George Anderson, printer, one hundredth pundis, in satisfaction to him of the superplus he disbursit in transporting of his gear to this burghe, by the ten dolloris he gave him of befoir to that effect: and also in satisfaction to him of his haill bygone feallis fra Witsonday in anno 1638 to Martimes last."

One of his first productions was a quarto pamphlet, sixteen pages, for the first meeting (1638) of the General Assembly of the Church of Scotland. A copy of this rare specimen of printing in Glasgow is carefully preserved in the University library of that city. Its title reads thus:—

"The | Protestation | Of the Generall | Assemblie Of The | Church of Scotland, And Of | The Noblemen, Barons, | Gentlemen, Borrowes, Ministers And Commons; | Subscribers of the Covenant, lately | renewed, made in the high Kirk, and at the | Mercate Crosse of Glasgow, the 28, and 29, | of November 1638. | Printed at Glasgow by George Anderson, | in the Yeare of Grace, 1638. | "

George Anderson's imprint is to be found on numerous books issued during the many years he held office as printer to that city. After his death, which occurred in 1647, Glasgow seems to have been without a printer again. A son of George Anderson, also a printer in Edinburgh, was appealed to by the Magistrates and Council of Glasgow to remove there, which he accordingly did, but after four years' stay he returned to Edinburgh. His fare and cost of removal of

goods were defrayed, by vote of the Council, out of the Treasurer's funds.

The events that followed no doubt were anticipated, and largely influenced Anderson's return, for in 1663 he obtained the appointment of printer to that city and college; and later, in 1671, he was appointed the King's Printer for the whole of Scotland. This right was exercised in a very arbitrary way, and prosecutions for the slightest infringements were very frequent. After his decease the right was rigorously maintained by Andrew Anderson's widow. An attempt to stop the publication of a black letter edition of the New Testament of Anderson's successor, Sanders, in Glasgow, by inducing his workmen to leave him, led to an action being brought before the King's Privy Council, who decided, in 1671, that he should be allowed to finish his work, and decreed further that every printer in Scotland had an equal right to print the New Testament and Psalm Book in the type or letter known as English Roman. Sanders afterwards acquired, by purchase, some share of the Royal Patent, and hence was allowed to style himself as one of the King's Printers. Both in Edinburgh and Glasgow the character of printing generally was at a very low ebb—a state of things not altogether confined to this part of the United Kingdom. It was prevalent everywhere.

The days of "brown sheets and sorry letter" were eventually succeeded by a period of general improvement, chiefly brought about by the better casting of English types. One of the most prominent names that obtained distinction for good printing was that of Foulis (R. and A. Foulis). The firm were appointed University Printers, and

published a great number of books, of singular beauty and excellence, in their Glasgow office. Scotland has succeeded in maintaining a reputation for its typography to the present day.

In Ireland was one of the last places in the United Kingdom into which printing was introduced, viz., Dublin, in 1551. It is supposed that most Irish authors had their works printed in London. A Book of Common Prayer was, however, printed there about this period by Humphrey Powell, in black characters, and of a large quarto size.

Queen Elizabeth presented O'Kearney with a fount of Irish type, which appeared in a publication in 1571, and also in a Catechism, issued in the same year, from the press of Franckton. It was not exclusively Irish, some of the "sorts" being made up of Roman and Italic characters. A new fount of Irish type was cut by Moxon, and used by Robert Everingham, in 1681, in printing Boyle's New Testament.

Several publications, with Waterford and the year 1555 printed on them, are generally believed to have been executed in London.

A very remarkable printer named Baskerville arose in the Midlands about the middle of the Eighteenth Century. Born at Wolverley in 1706, he did not, however, set up as a printer until 1750, and then not until he had tried various other occupations. His work soon secured him fame. Some seven years after his establishment at Birmingham, where he commenced, he brought out a handsome quarto edition of Virgil. It excited a good deal of admiration, and also raised a storm of controversy in the literary world, on account of the types used by him, made from his own designs. These letters were

certainly elegant and symmetrical in shape, and considered preferable to many of the book faces that obtain in modern works. These types were much praised both by Macaulay and Dibdin. Many excellent typographical examples of his press can be seen in the British Museum and other public libraries.

Baskerville issued in all some fifty publications, including a Bible, a Greek New Testament, the works of several Greek and Latin writers, as also many English authors. Beside making his own type, ink, and the materials used in the business, he also constructed his own presses. His types were disposed of, after his decease, to a literary society in Paris, about the year 1779, for the sum of £3700.

Baskerville, agreeable to his opinions, was buried in a tomb of masonry, formed in the shape of a cone, under a windmill, in his own garden. His house, which adjoined the garden, was a handsome edifice, situated at the top end of Birmingham. He had a pronounced horror of every form of priestcraft, and would have no dealings with it. In the riots of 1791 his residence was destroyed, but his remains were not suffered to be disturbed.

One other typical English typographer remains to be mentioned, and that is the writer and poet, William Morris, of more recent times. He also printed from types of his own designs, beautifully finished, after the style of the early Venetian printers, and his productions were unique and original in every way, and much sought after by book lovers. Among the many productions issued by his press, termed The Kelmscott Press, and established in 1891 at

Hammersmith, are Caxton's "Golden Legend," William Morris's own romance, "The Glittering Plain," and several of Chaucer's writings. The printing was executed in the old way by the iron press, on antique paper and vellum, having previously been damped. This method lends itself to that mode of printing. The illustrations are no less a feature of William Morris's press, being specially drawn by Sir Edward Burne-Jones, and printed from woodcuts.

V.

The Earliest Form of Wooden Presses—Invention of Iron Press by Earl Stanhope—Introduction of the Cylinder, Flat Bed, and Rotary Machines—Multi-Colour Machines—Etc.

WITH the invention of movable types came also the beginning and development of the printing press. The earliest form of printing apparatus resembled in appearance that of a cheese press. It was worked by the aid of a screw and movable bar, by which means a wooden block was lowered on to the type forme, the resulting impression being a heavy, dead "pull." Such a method was alike cumbrous and laborious to manipulate, and naturally lacked in evenness, yet this type of press, with scarcely any variation, continued to be used up to the Seventeenth Century, after which time improvements followed in somewhat rapid succession.

It is interesting to note that a craftsman named Mentel or Mentelin—claimed the inventor of typography—mentions in the colophon of his German Bible, in the year 1460, that he was printing as many sheets per day as Gutenberg, viz., 300, which number we may assume was a record day's work of this primitive form of printing. A number of these early specimens are still to be seen, and compare very favourably with many modern productions, and certainly surpass those of the latter end of the Seventeenth Century in England. Considering the indifferent means at

their disposal, the early pressmen are deserving of the greatest praise.

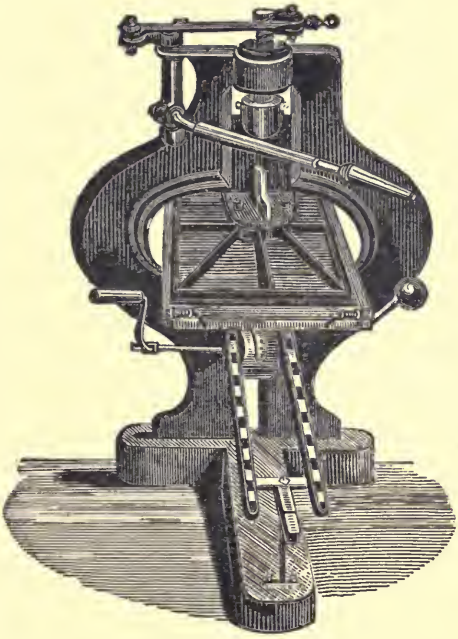
For fully 150 years the wooden press had been in use before a change took place. Then came a simpler form of moving in and out the carriage, followed by a new arrangement of the screw, to ensure a more perfect impression on the type formes.

To Charles Mahon, Earl of Stanhope, we are indebted for an altogether new departure in the construction of presses. He introduced a new principle of working the pressure by levers, while the press itself was made of iron. At first the experiment was attempted of adapting the levers to the old style of press, but eventually the iron-built press displaced entirely the wooden pattern. The advantages of the new style were obvious—the platen, hitherto clumsy in its working, was brought down on to the type bed with more ease and regularity, and converted, at the right moment, that motion into pressure. This treatment was easy of control, and though the build of the press was heavy, there was really less expenditure of energy.

In 1813 John Ruthven patented a press on the lever principle, with several improvements, much after the style of Stanhope's.

The Columbian Press came next, in 1816, and still continues to be very extensively used in this country. A new device is introduced, and the screw is dispensed with altogether. George Clymer, of Philadelphia, U.S., was the patentee of this improved make. Various other developments followed, notably one by Peter Smith, an American, connected with Messrs. Hoe. This press was further perfected by Samuel Rust, of

New York, and was named the "Washington." Briefly, the frame had the uprights at the side hollowed for the introduction of wrought-iron bars, which were firmly secured at the top and



The Stanhope Iron Press.

bottom of the casting. The effect of this departure added strength, while diminishing the amount of metal used in its construction. For light and even impressions this particular build of press was undoubtedly the best yet invented.

A workman in the London "Times" office was the first to introduce an automatic press. He received a good deal of encouragement from young Walter, the proprietor's son, but became unpopular with his fellow-workmen, and by none was he opposed more than by those who worked at the hand presses.

As far back as the year 1790 we find that a patent was taken out by one named William Nicholson, the terms of which covered "the idea of cylinder presses, in which the formes should be placed upon a flat bed or cylinder at will and receive the impression from a cylinder covered with cloth or some similar material. Between the bed and cylinder, or between the two cylinders, the sheet was to be fed in and printed. The ink was to be put on by a roller built up of cloth and covered with leather." Robert Hoe, whose description we have quoted, thinks these patents of Nicholson's were "mostly schemes," and that he did not possess sufficient practical knowledge to realize them. In the words we have quoted there is also an indication of the development of the roller by which the forme is inked. They were made of the same texture as that used in the old form of hand balls, until superseded by a composition, similar to that used to-day.

The introduction of the continuously revolving cylinder steam press is due to a German named Frederick Koenig, of Eisleben, the son of a small farmer, who took out his first patent in 1814. Unfortunately he received but little encouragement from his own countrymen, hence he decided to make the journey to London, where (in 1806) he met with the kindly assistance of Thomas Bensley, a printer, and so was enabled to perfect his

invention. One of his first specimens of steam printing was the issue of "The Times" itself on 28 November, 1814 (printed one side only at a time), at a varying speed of 800 to 1100 sheets per hour. Koenig's machines were afterwards adapted for printing one or two sides as required. These models proved very satisfactory for a time, until displaced by another "perfecting press," of a simpler kind, made by Applegath and Cowper.

Koenig had previously, in 1812-1813, printed a part of Clarkson's "Life of William Penn," by way of experiment, assistance being ably rendered him by a fellow-German named Bauer.

Koenig's device, which he invented, is still considered the most efficient reciprocating motion of the type bed—"the forme was placed on a flat bed, the cylinder over having a three-fold motion, or stopping three times, the first third of the turn receiving the sheet upon one of the tympans and securing it by the frisket; the second giving the impression and allowing the sheet to be removed by hand; and the third returning the tympan empty to receive another sheet."

From an interesting publication issued by "The Times" in 1904, we find that the introduction of machinery to work by power called forth a good deal of opposition and resentment by the employees at that time. Quoting from the pamphlet we read: "An attempt was made in 1810 . . . to stop publication, by a strike of the workmen, which lasted five months. When fresh workmen were employed they were waylaid, and the police had to intervene. Twenty-one persons were tried at the Old Bailey, and of these nineteen were sentenced to punishments ranging from nine months to two years." Following upon

these events came the introduction of Koenig's machines, when the obstruction re-manifested itself. They threatened destruction to "Koenig and his traps," so ferocious was their opposition to the smallest improvement in any way, or change of style of production. "While the disaffection was at fever-point," we read, "on a dark November morning at six o'clock, Mr. Walter entered the press-room (the presses of Koenig had been working hard during the night in printing). The clamour subsided into an expectant silence, upon which the following words fell with a memorable precision of utterance: '*The Times* is already printed by steam. If you attempt violence, there is a force ready to suppress it. If you are peaceful, your wages shall be continued until similar employment can be procured for you.'"

The table of progress hereunder is interesting, as showing the progressive rate of speed:—

Date.	Machine.	Max. number of Sheets per Hour.
1814	Koenig	1,100
1827	Applegath	2,000
1848	Applegath	4,400
1857	Hoe	6,000
1860	Walter	12,000
1884	Walter	24,000
1895	Hoe	36,000

The first "power" or steam press upon the bed and platen system was that made by Daniel Treadwell, of Boston, U.S., in 1822, but it does not seem to have ever got upon the market. Other machines of this type were devised by Isaac Adams in 1830 and 1836, and Tufts in 1834, capable of a speed of 1000 sheets per hour.

Improvements in printing machines followed apace, not only in London, but in New York, Germany, and other directions.

One of the most ingenious and practical devices invented for these early printing machines was that of grippers, or "fingers," in connection with the movement of a flat bed and cylinder. It was a patent by Napier, in 1828 and 1830, for the conveyance of sheets around the cylinder during the impression, and for delivering them after printing. Tapes or strings had hitherto served this purpose. Napier was the first to bring out machines (or presses as they are termed) in which the impression cylinders were of smaller dimensions, to make two or more revolutions to each sheet printed, and he also devised the toggles for bringing the cylinders down to print on the forme, and for raising them to allow of the type forme running back without coming in contact.

Applegath's type-revolving press was certainly one of the most remarkable ever made. It was built for use in "The Times" office in 1848, and was the only one of its kind constructed. All the cylinders, instead of being horizontal, as in other machines, were vertical. The type was placed on a large upright central cylinder, but having many flat surfaces—polygonal in shape. It was, however, capable of running at a speed of 4400 sheets per hour, printed on one side only of the paper at a time.

To meet the ever-increasing demand for improvement, Messrs. Hoe also brought out a press, known as the Hoe Type Revolving Machine, from patents taken out by Richard Hoe. The basis of this invention consists of an apparatus for securely fastening the formes of types on a central cylinder

placed in a horizontal position. This was accomplished by the making of cast-iron beds—one for each page of the newspaper. Column rules had to be adapted somewhat to a V-shape, tapering towards the foot of the page, and secured by a proper system of locking up. The speed attained by this method was about 2000 sheets per hour, and without any risk whatever of the type falling from the revolving cylinder. Additional impression cylinders were added as required, thereby ensuring greater output. Altogether it was an advance on what had already been attained.

The "Stop-Cylinder" machine was devised and patented by a Frenchman, named Dutartre, in 1852. This press was considered a great boon to fine letterpress printers. It is very extensively used to-day, and has been brought down to date by many excellent improvements.

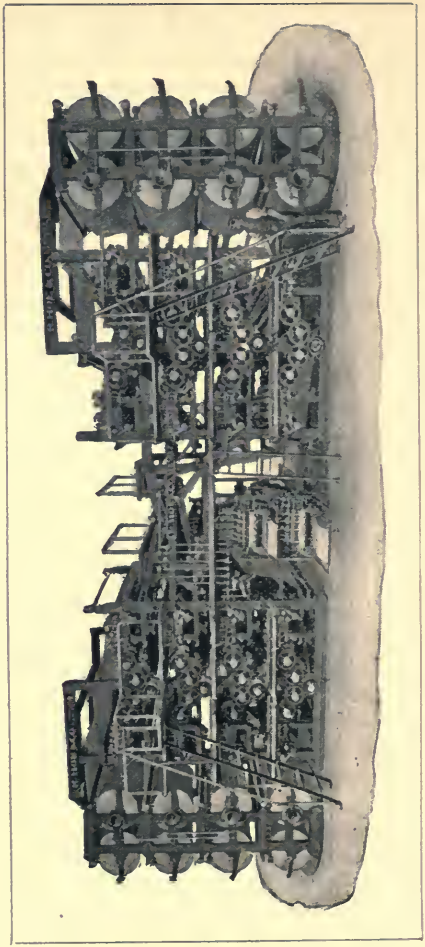
It would be superfluous to enumerate all the different stages of development in the construction of the printing machine, but we have endeavoured to trace the more important inventions which have been put forth to meet the ever-increasing demand for machines of greater speed. Hitherto machines were constructed more or less with a special view of turning out equally fine letterpress and woodcut work upon a stop-cylinder principle with a flat bed; whereas on the rotary principle (constructed for fast news printing only), stereo plates were substituted for the type pages. These plates were cast on the curve to fit the cylinder, whilst the sheets were printed from a reel of paper, usually containing about four miles in length, with an average, in rotary machines of modern make, of twenty minutes to run off the spindle.

The original idea of printing from a continuous roll of paper emanated from a William Bullock, of Philadelphia, who constructed the first machine of that modern order now known as rotaries. This was followed by the proprietors of the London "Times" with a rotary perfecter in 1868, and later by Marinoni, both machines being similar in principle to the first-named. Hoe's fast-printing web machines came next—one of which, the "Quadruple," constructed in 1887, was made to produce eight-page papers at a running speed of 48,000 copies per hour, delivered with exactness, cut at the head, pasted, and folded ready for distribution.

We are enabled to show an illustration of the latest and fastest rotary machine, made by the well-known firm of Messrs. Hoe, of New York, seven of which have recently been erected in London, at the office of Lloyd's Weekly News. It is styled a Double Octuple, and has a capacity for turning out 50,000 thirty-two page newspapers per hour, equivalent to 100,000 of sixteen pages, or 200,000 of eight pages, at the usual running speed.

A still further adaptation of the rotary principle, hitherto confined to printing newspapers from the reel, is now made for job work (black or colour). The design of the new presses, as they are more generally termed in America, is a radical departure from the ordinary type of machine. Compact, and occupying but little space, they are capable of turning out work at the rate of 3000 and upwards per hour.

Much attention is being given in America to the art of colour printing, and evidence of this is seen in the weekly editions of several New York papers. This class of work is executed on a



Double Octuple Press—Largest Printing Machine in the World.

Multi-Colour Electrotype Web Perfecter, capable of printing high-class illustrated work in as many as eleven different impressions or colours at one operation, as well as being able to do the same work as an ordinary news machine. It will print in six colours on one side of the sheet and five on the other, at a speed of 16,000 eight-page papers per hour, or, in other words, at every revolution of the cylinders produce a result equal to two perfect eight-page papers in colours. From four to thirty-two pages may be printed on this press, with either one, two, or three double width rolls of paper (four pages wide). It is also claimed to produce magazine work (with pages half the size of the regular issue of the paper) at from 16,000 to 24,000 an hour, from sixteen up to forty-eight pages, delivered folded, cut, and automatically wire-stitched, with all the pages printed in colours or half-tones.

Machines of this description have contributed greatly to the development of a higher grade of colour work, and in the United States there is a tendency to introduce portions of colour work into all classes of periodical publications. What apparently, at one time, seemed an insuperable difficulty, viz., to print half-tones at one operation, on both sides of the sheet, without slurring, is now claimed to be a matter of everyday occurrence.

"Collier's Weekly," published in New York, is the best known example of fine half-tone work done on a perfecting machine printing from the reel. In such cases as this, when using fine inks, it is not necessary to make immediate delivery, therefore before reaching the public the sheets have ample time for drying.

It is thought that the next important move in the direction of colour printing will be the development of coloured half-tones on these rotary perfecters, where speed and quick delivery are essential factors.

The multi-colour process recently invented by Mr. Ivan Orloff, of the Bank Note Printing Establishment of the Russian Government, was claimed to be a very great advance on anything before attempted in the way of colour printing. A syndicate was formed to introduce the novelty, and a machine put upon the market. It was a comparatively small machine, but, like many other things of utility, its principle was simple. A large colour block comes into contact with a composition roller, where it deposits its colour. Each colour, in short, is brought into contact with a transfer roller, till the whole of the design, no matter how many colours, is on the transfer roller. Then a re-transfer of the whole picture is made to the printing plate, the printing plate goes to the paper, and the thing is printed. A speed of 1000 perfected sheets per hour, say, in six colours, with accurate register, was claimed for it. On the score of economy, compared with the old system of one forme for each colour, the saving ought to be very considerable, as well as in matter of floor space, material, etc.

The story of development from the rude and clumsy wooden press of Gutenberg (with all its tedious manipulation) down to the marvellously constructed machinery of to-day seems to read indeed more like a romance, but the limit of invention is yet scarcely reached, judging from the part electricity may be called upon to play in the near future. The complicated shafting, and the

paraphernalia necessary thereto, hitherto driven by gas engines, are being gradually superseded by the electric motor, and with much greater smoothness and cleanness—an important factor in the further evolution of the printing press.

Reduced Fac-simile of the first issue of "The Times," 1788.

VI.

Progress of the Newspaper Press—Days of Persecution—Remarkable Statistics—Some Curious Printers' and Translators' Errors.

THE development of the newspaper press, in its struggle for liberty and freedom, has often been associated with some of the most striking events of history. Its portrayal of the content of man's existence and work has not always been rightly expressed; but if the prosecution of its mission has not been without failure, on the whole its work has tended towards the elevation of mankind, and the best proof of the attainment of its object is seen in the part and influence it exercises in the daily affairs of life. By its means we are familiarized with every part of the globe, and with all that is passing of interest among its inhabitants.

As far back as the days of the Roman Empire there was an official newspaper (written) in use, but not until nearly 200 years after the introduction of movable type do we find a record of the first modern newspaper, started at Frankfort, in 1615.

The oldest newspaper in Great Britain is the official Gazette, of which two editions weekly have been issued uninterruptedly since its start in 1666-7, by John Bill, in the King's Printing Works at Blackfriars, erected on the site of the Theatre, after the great Fire of London.

About the same date Nathaniel Batter first issued the "Weekly News," but failing to meet

with success it was discontinued after a few years. In 1695 another attempt was made to run a daily, but it only lived four days. The first successful daily newspaper appeared in 1703—the London "Daily Courant." It was followed by many other attempts to meet the public taste, as told in a statement published by a writer in 1711: "There are published (in England) weekly, about 44,000 newspapers, viz.: 'Daily Courant,' 'London Post,' 'English Post,' 'London Gazette,' 'Postman,' 'Postboy,' 'Flying Post,' 'Review,' and 'Observator.'" An average circulation of 5000 copies each. "The Public Advertiser" began in 1726, "The Morning Chronicle" in 1769, and "The Morning Post" in 1772. (The latter is the oldest existing daily newspaper.)

The "Times" was first started under the title of "The Daily Universal Register" in 1785, but was endowed with its present title in 1788. All the other leading daily papers in London and the principal provincial towns are comparatively modern.

The first newspaper in Scotland was "The Mercurius Politicus" in 1653, and in Ireland, "The Dublin News Letter" in 1685.

In the United States of America "The Boston News Letter" appeared first in 1704; while in Europe two of the leading papers most widely known are the "Allgemeine Zeitung," started in the year 1798, and the "Journal des Débats," in 1848.

It should be mentioned here, in connection with "The Public Advertiser," that Henry Samson Woodfall, founder of the great family of Woodfalls, and Master of the Stationers' Company in 1766, had charge of the editing and publishing of that

journal when only nineteen years of age. It was the equivalent of "The Times" of to-day. Being a printer he superintended all the detail of the office, and as a man of fearless courage and integrity he did not hesitate to expose what he considered corrupt and wrong, and hence came into conflict with the powers. To quote his own statement, he says "he had been fined by the House of Lords, confined by the House of Commons, fined and confined by the Court of King's Bench, as well as indicted at the Old Bailey." The celebrated Letters of "Junius" appeared in "The Public Advertiser" during his editorship.

William Woodfall, his brother, was also a printer, and equally remarkable, but chiefly as a Parliamentary reporter. He assisted in the printing and editing of "The Public Advertiser" as well as other London papers. Reporters at that time were entirely forbidden in Parliament, and it was considered a high misdemeanour for any one to make notes in the gallery of the House. However, Woodfall gave the public full reports of the proceedings, his memory being so retentive that it was an easy matter for him to fill his paper with columns of debate. In 1784 he was invited to report the debates of the Irish Parliament, and so great had his fame become that crowds would follow him in the streets, eager to get a glimpse of a man possessing such supernatural powers. He died in 1803, but the printing business was carried on until quite recently, and known under the style of Woodfall and Kinder. It is now closed.

"The Times" has always exerted a very powerful influence on great questions of the day, and no effort is spared to produce the

very best literary, journalistic, and typographical results—and with distinct success. An entirely new set of type is taken to the printing office for each day's issue, after which it is returned to the founder for recasting.

In the early part of the Nineteenth Century it was customary to illustrate the daily paper by various kinds of wood engravings.

"The Times" frequently appeared with engravings of the scenes of murders, battle and naval scenes, and other similar events, but great alterations have taken

THE
Universal
DAILY
Register.
FRIDAY, JULY 14, 1786.
Price 3d.

Reduced Fac-simile of "The Daily Universal Register," 1786

place in the style of newspapers since those days. The introduction of the halfpenny newspaper has revived the use of illustrations with happier effect.

A great deal of persecution was meted out in the early days to newspaper writers (when the penal code bristled with monstrous penalties on very trivial pretexts), and oftentimes were made the objects of bitter resentment if they dared to express anything in the nature of criticism. One of the earlier editors of "The Morning Post," named Nicholas Byrne, on account of his sarcastic writings in that paper, was attacked and murdered in his own room. Many other writers during the reign of George III. were severely punished and fined, apparently for very slight offences.

It is stated that more money is spent in Russia in curtailing the influence of the press than is spent on education. In 1902 eighty-three newspapers were suspended, in various periods, amounting to thirty-one years. Twenty-six were forbidden to accept advertisements, and 259 editors were threatened with transportation to Siberia if they did not alter their conduct.

The Russian authorities did not mark the commencement of the Twentieth Century with any relaxation of the stringent regulations governing printing and publishing in the Czar's dominions. A new edict was issued proscribing all trade advertisements circulating in Russia. It stated they were to be printed in that country, and submitted to an official censor before publication. The edict further prescribed that the printing was to be in Russian type faces.

That the action of the censor in limiting the newspaper publications and "blacking out" important news had an unfavourable effect upon Russian arms during the Russo-Japanese war, is generally well known.

A good deal of trouble was caused by the Socialist Press in Germany some years back, ending with the suppression and confiscation of one or two of the leading papers, which had advanced opinions beyond the ordinary limits of newspaper criticism. However, to-day there is freedom accorded to the press in most civilized countries, except in time of war, when a rigid censorship is carefully exercised for obvious reasons. The late war in S. Africa was a lamentable exception.

There are instances existing of the printing of news sheets in the different languages of its various cosmopolitan contributors. "The China Times," which is printed in seven different languages, hails from Pekin, and is published in English, German, Italian, and Russian, as well as in Chinese and Japanese, &c. "The Pantobiblion Magazine" is another remarkable periodical of this class, published in St. Petersburg, containing critical reviews of the publications of the world. Each article is printed in the language corresponding to the publication reviewed. It is stated that articles have appeared in as many as fifteen languages. In Austria there is circulated a bimonthly review, the "Acta Comparationis Literarum Universarum," containing as many as thirty languages in one issue, and having contributors in all parts of the world.

Some idea of the development of the modern newspaper press, since the beginning of the Victorian era, may be gathered from the following

statistics: The newspapers at the beginning of that epoch numbered under 300, of which there were thirteen dailies, forty-two weeklies, published in London; 150 in the provinces; and less than 100 in Scotland and Ireland—none of the latter being dailies. Of the London dailies, at that time, "The Times" sold about 20,000 copies, equal to the total circulation of the other twelve dailies. Proprietors of provincial weekly papers were considered fortunate if they could dispose of 1000 copies per week.

In 1839 the London dailies had not increased in number, but the London weeklies and most of the provincial journals had considerably swollen in numbers, and from that period they continued consistently to increase.

The abolition of the stamp duty on newspapers was brought about in 1855, and from that time the reign of the cheap daily newspaper began. This objectionable tax was first imposed in the year 1712, and made still more severe by the Act of 1820, which fixed the amount at fourpence per sheet, and three shillings and sixpence duty on each advertisement. The Whigs reduced the duty in 1836 to a penny, but during the Crimean War, when the demand for news was very great, even a penny was found intolerable. The repeal of this obnoxious duty marked a new era of freedom for the British press.

The downfall of the first French Republic, and the re-imposition of a stamp duty, put an end to newspaper enterprise in France for a long time.

The "Newspaper Press Directory" gives the total number of newspapers published in the United Kingdom as 2441, distributed as follows: London, 431; English Provinces, 1432; Wales,

113; Scotland, 258; Ireland, 190; Isles, 17. Of these, 187 are dailies published in England, 7 in Wales, 18 in Scotland, 18 in Ireland, and 4 in the British Isles—a combined circulation of nearly 9,000,000 copies per day, as against upwards of 12,000,000 in all the rest of Europe. It is computed that sixty-eight per cent. of the newspapers of the world are printed in the English language, and the total number of His Majesty's subjects who read these pages is said to be nearly 400,000,000.

According to the calculation of the "Fourth Estate" there are throughout the world 43,000 newspapers; of these 5410 are dailies, one-half of which are produced in the United States. In all there are some 20,000 papers in the States, comprising newspapers, magazines, and miscellaneous reviews.

The first newspaper in Australia appeared in 1803, some fifteen years after the first settlement in New South Wales. A printing press had gone out with the first fleet in 1788, but no one knew how to work it, and consequently it remained unused until that time.

It is worthy of remark that in Japan there was a notable increase in the number of newspapers recorded during the present Russo-Japanese War. Altogether there are some 4500 newspapers and periodicals, of which 2300 are dailies, and no less than 120 of these are published in Tokio, the capital.

The Secretary of the Brussels Bibliographic Institute, M. Paul Otlet, estimates the number of printed books, from the invention of movable type until January, 1900, at 12,162,000 separate works, and the number of periodicals at between

fifteen and eighteen millions. Germany and German Austria together, in point of numbers, take the lead; France, Italy, England, the United States, and the Netherlands follow in order of output; Germany excels in book production; and the United States leads the world in the production of periodical literature.

From ten to twelve millions is the total given of books sold in this country in a year, not reckoning the cheap sixpenny reprints and second-hand volumes. Nearly 2500 magazines are published in the United Kingdom, of which at least upwards of 500 are of a decidedly religious character.

If the style of printing, and the means for turning it out, have progressed so wonderfully in the past fifty or sixty years, it is also satisfactory to chronicle equal progress in the correctness of the various publications as compared with days gone by; much greater care is being exercised now in the matter of revision.

In the past some curious mistakes in printing and translating have been made, which serve as a warning against the lack of vigilance of former correctors of the press. The "Breeches" Bible, a copy of which recently passed into possession of the King, is a grotesque example. It was printed about 1560, and derived its name from the odd rendering of Genesis iii. 7—"The eies of them both were opened . . . and they sewed figge-tree leaves together, and made themselves breeches."

John Baskett, who succeeded John Bill as King's Printer of "The London Gazette," was responsible for the production of what is known as the "Vinegar" Bible. He had acquired, by

purchase, the Bible patent, and in this edition, printed in 1717, substituted the word "vinegar" for vineyard in the headline of Luke xx. The edition was stigmatised as a "Baskett-full of printers' errors," although in every other respect it was a very creditable production.

Distinctive names were given to other editions of the Scriptures on account of departures from the authorized text, as for instance that of the "Treacle" Bible, which substituted that word for balm (Jeremiah viii. 22); the "Place Makers'" Bible—"Blessed are the place makers, for they shall be called the children of God" (Matthew v. 2), date, 1561-2; and the "Printers'" Bible, which perhaps explains all the others, wherein David is made to complain that "printers (princes) have persecuted me without cause." There are many other queer errors, in various editions of the Bible, which command high prices merely as interesting curiosities. Considering the disadvantages under which the early printers and translators laboured, it is surprising that mistakes were not more frequent.

VII.

Typefounding: Past and Present—The Dutch Model—Revival of English Types—Machine-made Letters—Type Composing and Casting Machines—Etc.

IT was not for some years after the invention of typography that letter cutting began to be a separate industry. The principle of casting type was continued for a long time on the lines of the first craftsmen, who moulded their designs in plaster and clay, and then filled them in with the molten metal. A separate mould was required for each letter, which was finally finished by hand. Poster type, at a much later period, was cast in sand and clay moulds, before the invention of sanspareil matrices. These, in their turn, have been superseded by wood letters for the printing of posters. The matrices referred to were made of brass. In casting from clay moulds it would be impossible to repeat the operation by using the same mould, but the difficulty was surmounted by utilizing the old types (after being touched up) for making fresh moulds.

These primitive methods, slow and uncertain at their best, soon gave place to the metal form of mould, which was the system adopted by those who took up the typefounding as a distinct trade. The variety of metals used at different times in the making of type embraced steel, brass, copper, tin, lead, pewter, etc.

The art of forming letters was generally regarded as a secret, and the few, at this time,

able to cast at all satisfactorily were extremely careful lest they should be the means of communicating their knowledge to others. This was particularly the case with the early letter cutters. Mr. Moxon remarks, in his book on "Mechanical Exercises." published in 1683, in speaking of letter cutting for printing purposes, "that it was a handiwork at that time kept so concealed among artificers of it that he could not learn any one had taught it any other; but that every one that had used it learnt it of his own genuine inclination"; and, further, he says—"by the appearance of some work done, a judicious eye might doubt whether they went by any rule at all, though geometric rules in no practice whatever ought to be more nicely or exactly observed than in this."

Mr. Moxon, however, seems to have been the first of English letter cutters to reduce to rule the art of cutting letters. He invariably brought to bear geometrical, mathematical, and mechanical skill in the formation of his type. He left many examples, which he published, as a guide to others, and what had hitherto been obtained by guesswork was now made according to the precise rule he laid down.

It was everywhere apparent that the Dutch had acquired some pre-eminence for the beautiful shape of their Roman types. Moxon speaks of them as "the true shape," and says they were "formed so exactly of the mathematical regular figures, straight lines, circles, and arches of circles, and with such a true placing of fats and leans," that he "set himself to anatomize the proportion of every part and member of them," and being a practical man, Moxon adopted, as the proportions

of his own type, the shape of those of Christofel Van Dyck. So celebrated was this Dutchman in this branch of art that, when the Stadthouse at Amsterdam was completed, he was requested to give the finishing touch to these buildings, and was offered £80 sterling for drawing on paper the names of the several offices that were to be painted over the doors.

Although jealousy appeared to be rife amongst the early letter founders and cutters (which, perhaps, helped to make them more secretive) on the other hand, there were all sorts of prohibitive legal restraints. The spread of knowledge, which the printing press was calculated to effect, was not altogether viewed with favour. Many were alarmed, and eventually, by an order of the Star Chamber, dated on the 11th July, 1637, it was decreed that "there should be four founders of letters for printing, and no more," and as the places of these became void they were to be filled up by the Archbishop of Canterbury, or the Bishop of London, with six other High Commissioners. On the dissolution of the Court (16 Charles I.) these restrictions were removed, but, unfortunately, were re-imposed in the time of Charles II., when it was further enacted that "no founder was to cast any letter . . . or to bring from parts beyond the seas any letters founded or cast for printing," nor was any person "to buy any letters or other materials belonging to printing without application to the Masters and Wardens of the Company of Stationers." This Act expired in 1693, and from that time the art of typefounding became more generally known, and improvements followed both in shape and in the uniformity of the letters.

Up to within half a century ago typefounding was carried on with steel dies and hand moulds, the latter manipulated to accommodate varying widths of type bodies. A good caster would produce about 2500 letters per day, after which the type had to be dressed, and the superfluous metal removed before the type was fit for use. This was the ordinary method in vogue up to about 1850-1860, when machine type-casting was introduced.

The cutting of punches was a much more tedious process, and required great care and judgment. A punch cutter of the old days would cut one fount of type in a twelvemonth. This method is now being superseded by a punch cutting machine —the latest invention for producing original faces of type.

The striking of matrices, hitherto performed solely by hand, is now being effected by the aid of machinery, each matrix taking about ten minutes to make, with every appearance of perfect exactness and finish.

A common practice of some founders is to copy other designs by the use of electrotype matrices. The simplicity and quickness of this method is chiefly the reason why it is so largely resorted to.

At the beginning of the Eighteenth Century, printing had fallen to a very low ebb in England. The productions of the press were at best but slovenly exhibitions of typography compared with those of continental craftsmen. This was no doubt largely due to the "sorry" letter turned out by English founders. Recourse was had to the Dutch type for the better kind of work, which was considered the model at that time. The University Press of Oxford was largely stocked with

these foreign-made letters, many of which had been presented by the Bishop of Oxford in the year 1670.

Shortly after this depression in printing and typefounding arose William Caslon, an ingenious workman, skilled in engraving of gun barrels, and designing of tools for bookbinders. Having shown unusual skill and accuracy in the making of bookbinders' punches, attention was drawn to his marked ability, insomuch that he was induced to take up letter making, with promises of substantial support. His success was phenomenal, and by his unaided efforts he eventually succeeded in diverting the preference for Dutch types to that of his own manufacture; hence, to some degree, he was largely responsible for the revival of English printing.

In the year 1720 the Society for Promoting Christian Knowledge entrusted Caslon with the cutting of a new fount of Arabic for use in the printing of a New Testament and Psalter in that language. The work was executed, and gave great satisfaction, and from this time his types generally began to be sought after.

The beautiful shapes of the Roman and Greek letters which appeared in an edition of Selden's Works, published in 1726, were cut by Caslon; also a Pica Coptic, used in Dr. Wilkinson's edition of the Pentateuch. He was also entrusted with casting fresh types for Bishop Hall's Hebrew Psalter, published by Bowyer in 1733, the types of Palmer (cast by Athias), which were originally intended for the publication, being rejected as too worn. Caslon also introduced a "Black" letter, an imitation of the style of Wynkyn de Worde. An Armenian type for Whiston's edition

of "Moses Choronensis," and an Etruscan letter for Mr. Swinton, of Oxford, the learned antiquary and philologist, who published his "De Linguâ Etruriæ" in 1738, were also the work of his foundry.

ΛTTΛ ПNSΛK ΦП ÏN HIMIN-
ΛM: ϒЄIhNΛI NΛMϏ ΦЄIN:
ЦIMΛI ΦIПdINΛSSNS ΦЄINS:

Gothic Type.

Fædeɲ upe þu þe eaɲt on heoɲenu. Si þin nama ȝehalȝoð. To-becume þin ɲice. Ȝepuɲðe þin pilla on eoɲ-

Saxon Type.

Ձանզզպատ խաչվոյմիս նո աստ-
ուածայնորն 'ր քեզ ձնորհացն, և
զանդուլ Հոգւոյն 'ի վերայ քոյ

Armenian Type.

Пєпшт єт ϯєпіі ϕнотї : ⲗⲗ-
ρєϥ тотϐоѫхє пєкрхп : ⲗⲗ&ρєс
ѫхєтєкⲗⲗє тотро : пєтєϩпⲁк

Coptic Type.

Cast from modern matrices, struck from Caslon's original punches (about 1730).

It was in the nature of things that Caslon should issue a Specimen Sheet of his various types, which he published in 1734. It contained some thirty-eight founts of types, besides borders and ornaments, most of which were his personal handiwork. A Specimen Sheet, emanating from the same foundry, appeared as a supplement in

an edition of Ephraim Chambers's Cyclopædia, in 1738, with the following comment—"All cast in the foundry of Mr. W. Caslon, a person who, though not bred to the art of letter founding, has, by dint of genius, arrived at an excellency in it unknown hitherto in England, and which even surpasses anything of the kind done in Holland or elsewhere." That this was the general opinion everywhere entertained of Caslon's work we may also infer from Ged (in his work on "Block Printing") adverting to the period of 1730, wherein he observes that Caslon "had already eclipsed most of his competitors and introduced his type into the principal houses in the metropolis, as well as secured the custom of the King's Printers, to the exclusion of others."

To go back for a brief period we find it recorded that the typefounding business of the Grovers came into the market for sale (in 1728), and Caslon was seriously considering a purchase, but fortunately the project fell through, and he was left free to pursue his original ideas.

Although Caslon had produced such excellent designs in types, he had no doubt imitated largely the style of the Dutch printer, Elzevir, whose types were much admired by the English founder.

About the time Caslon commenced type making in England it was begun in Scotland by James Duncan, whose first results were crude and badly designed, but eventually he produced some excellent and original faces.

When the first John Walter (of "The Times") took the premises in Printing House Square in 1784, it was "in order to develop a system of printing whole words, or parts of words, instead of single letters from metal blocks. It was as

a means of illustrating this mechanical device, known as the logographic process, that he decided to start a newspaper." On the front page of "The Daily Universal Register" the words, "printed logographically" were conspicuously displayed. This system was continued for some time, but did not meet with any great favour from the compositors who had the arrangement entrusted to them. Possibly the mixing of them up together in the

Logographic Blocks.

cases did not facilitate very rapid composing, and eventually they were discarded.

The inventions connected with type-casting machines have been numerous, many of them being worthless; one of the most efficient that came to stay was that constructed upon the intermittent and reciprocating principle, capable of turning out type at the rate of 3000 per hour.

A new departure came in with the introduction of that known as the rotary system of type-casting. The procedure is automatic and continuous. It is capable of producing type at the rate of 60,000 letters per hour, against 3000 hitherto obtained. Rapidity and finish are claimed to be attained with some amount of success by this new system, whole alphabets being cast automatically at one revolution of the machine. The ordinary type-casting machine cannot be changed from the casting of one type to another without great care and time spent in the matter of adjustment. On

the rotary machine, as invented by Mr. Frederick Wicks, this change is claimed to be effected in two minutes. Moreover, the type is said to be produced in a finished condition the moment the machine begins to revolve.

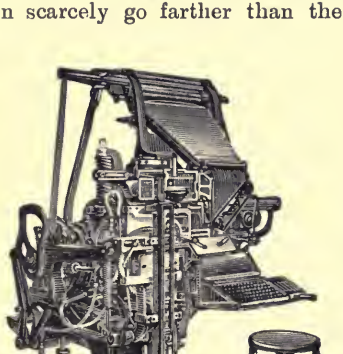
The quickness and cheapness of the type cast by these Wicks' rotary casters rendered the dis-

Rotary Type Casting Machine.

tribution of the letter after use, in newspaper work, unnecessary. This is the plan adopted by "The Times," as already alluded to, where the type made by these machines is supplied fresh every day, to the extent of about three tons per week, and set up by the Kastenbein composing machines used in that office. After the type has been

stereotyped for the purpose of printing, it is then transferred to the melting pot for re-casting.

Passing from foundry-cast types we come to the system of Type Composing and Casting Machines, and here it may be observed that we are at once confronted with one of the most wonderful of all the modern developments of the printing art. The genius of invention, it is said, can scarcely go farther than the present



The Linotype Machine.

printing and type-composing machines, unless it be possible to endow iron and steel with conscious intelligence, so nearly do they, in their mechanical movements, approach to intelligent action. While positive perfection in mechanics may safely be asserted as unattainable by human science or skill, we are confronted with a succession of inventions that are nothing less than startling in their

manifold claims to perfect the various processes of the printer's art. Judging by results already achieved it would appear that a state of comparative completeness had been reached.

The Linotype was the invention of a German named Ottmar Mergenthaler (a countryman of Gutenberg's, but resident in Baltimore, in the United States), about 440 years after the invention of movable types, viz., 1880. Ten years were spent in designing the first Linotype, which was, of course, by no means so perfect as the present machine; however, a large fortune was reaped by its sale. Mergenthaler died in 1899 at the early age of 46.

The modus operandi is, briefly, thus: The operator works from the keyboard in front, which he manipulates much in the same way as a typewriter. Each key depressed causes a matrix to be released from a magazine, which, when completed in a line and interspersed with space bands, is then, by a movement of levers, cast into a solid line of type. This is repeated in quick succession, and the matrices, by an ingenious device, are carried to the head of the machine and distributed for re-using. The matrices here referred to as taking the place of types are made of brass, and each has the face of a letter impressed on its side. Their use constitutes the great principle of the Linotype as distinct from other composing machines.

With regard to speed, this is determined by the deftness of the operator in manipulating the keyboard. An average of 6000 ens per hour for an operator would be considered equivalent to the work of five compositors setting type by hand. The machine is capable of turning out almost

everything except display work, and even fancy types that come under the latter category are now being cast for general use by these machines.

A later development is the use of double-letter matrices, each bearing two faces instead of one, and by their use an additional face can be set up without any change in the magazine. Apart from body types, "black letter," italics, figures, small caps, and two-line letters, can all be set up direct from the keyboard. All faces, from pearl to English, are composed on the Linotype, either leaded or solid.

The Linotype promises to become more general from the fact of its fulfilling so adequately the stress of newspaper offices just at the moment when expedition is all essential.

We are promised, in the future, a still more wonderful Linotype machine. It is proposed to do away with the magazine altogether, and by considerably reducing the number of matrices, to effect a very material saving in the cost of working. To lessen the number of matrices the proposed single or double-letter matrix is to have eight characters on its side, for each intaglio, instead of those now in use. So many improvements have been effected in the Linotype since it was first launched, that it is not improbable that some such alteration as this, to obviate the inconvenience of changing the magazine when requiring different characters of letter, will be forthcoming as a matter of urgency.

The Monotype is, next to the Linotype, one of the best known machines, both in England and on the Continent. It will be noticed that it comprises two distinct parts—a Caster and a Keyboard—and is therefore worked on an altogether

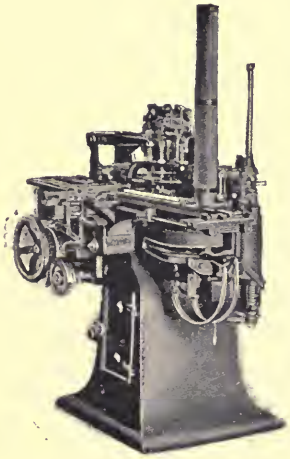
different principle to the Linotype. The original patents date back some twenty years, when the machine was invented by Mr. Tolbert Lanston, of Washington, in the United States. Like the Linotype, the machine has been greatly simplified and brought up to its present state by a number of improvements, which experience has proved necessary, although its basic principle has not undergone any change. The main feature of the

Monotype Keyboard.

Monotype is the casting automatically of a separate type for each character, much after the same manner as a rotary type caster. The advantage of the Monotype system is that the machine is also valuable as a type caster, inasmuch as the printer is supplied with type for use in general work, or to dispose of by sale if necessary. While the type itself is made of slightly softer metal than that made by ordinary founders, its replacement is easily and cheaply effected.

As many as 325,000 impressions are said to have been taken off Monotype printing for one job, whilst it has been used in case for years without re-casting.

The Keyboard of the Monotype is, in appearance, much the same as a Linotype or Typewriter, but only on a much larger scale. Any number of



Monotype Caster.

Keyboards can be in operation, as they are used apart from the Caster. They are manipulated with the assistance of compressed air, the object being the perforation of a paper strip or ribbon, which, when put upon the casting machine, governs the movements of the latter. The Keyboard is made up of three principal parts—a

bank of keys, corresponding with the characters in the fouut used, a series of punches, and a scale action, registering the body sizes of the type. There are in all some 225 matrices in the die case, corresponding with the keys on the Key-board. Roman, italic, clarendon, figures, fractions, and other signs are indicated by different coloured keys. The measure and type are governed by the index on the adjustable drums, and the width of the matter can be set to any measure up to 42½ ems pica. For spaces and quad lines no perforation of the ribbon takes place. The Monotype machine meets precisely the same conditions that are met by hand-set type, and the output is subject to all the manipulations, changes in text, correction of errors, make-up, etc., to which foundry-made types are now subjected. The Keyboard can be operated in, say, the counting-house, by one operator, the perforated spools of paper, as completed, being automatically rolled up in readiness to put upon the Caster. It has been shown that a speed of from 7000 to 10,000 letters can be attained per hour, and one Caster operator is able to superintend the work of several machines. It is of importance to know that founts are readily interchangeable, and the various sizes of types, or styles of faces, may be substituted for one another in the same machine, without any undue loss of time, or complicated mechauical adjustments, etc. By casting one size upon a larger body leaded matter can be produced. The type is cooled almost instantaneously by means of a continuous current of cold water, passing through a channel surrounding the casting chamber of the mould.

One other important thing about this system

is that when once the spool has been perforated it can be used over and over again.

A machine with such advantages has naturally proved itself most acceptable in the short time since it came into use. It has largely been adopted by the Government of the United States for use in their offices in Washington, and also by the Indian, Ceylon, and other British Colonial Governments.

There are said to be fully 1200 of these machines in use, half of which are on the other side of the Atlantic.

The Wicks' firm have brought out a Type-Composing machine, built on the same principle as that of the Kastenbein, one of which is being used by the "Morning Post."

There are numerous other makes in the list, but very few have managed to get upon the market. The two typical machines described are, however, sufficient for the scope of this work, and show clearly enough the progress of the art.

It is worthy of mention, as indicating the trend of things in the near future, that an inventor claims to set type by operating a Linotype key-board automatically by telegraph — in short, to operate a Linotype in a New York news office by means of a keyboard in London.

VIII.

Cognate Branches of Printing: Wood Engraving, Process Blocks, Stereotyping and Electrotyping, Electrical Printing, Etc.—Trichromy—Lithography—Algraphy—Typewriters—Conclusion.

IT now remains, in this closing chapter, to treat of the more important auxiliaries of the art—those cognate branches so indispensable to all modern printing—and in so doing we can only refer to the principal aids which are in daily requisition.

As regards the minor paraphernalia of the printing office itself the limit of usefulness has, perhaps, been reached, and the next advance would seem to lie in the direction of the artistic rendering of the work, as the varying dicta of fashion or taste shall decide.

Science and discovery are ever contributing their share of material with which to either increase the volume of output from the press, or to embellish the printed page, and hence many of the hazy theories that stood for so long as dreams have at length become concrete facts in the realm of printerdom to-day; and yet withal, perhaps before this Twentieth Century has barely emerged from its infancy, many of these same ideas, and other projects yet in their experimental stage, will have lapsed into disuse, or will have yielded place to something better.

One of the most important features of the modern press is the improved method of illustration, viz., the process or photographic block. It

is a complete departure from the severe style of woodcut illustration so long in use, not only in the mode itself, which allows events to be depicted more accurately to nature, and not as hitherto after the imagination of the engraver, but it has called into use an entirely new manufacture of paper, adapted to this modern style, possessing a more highly finished surface, for the fine printing of the photo block. If the appearance is more pleasing, it, however, lacks the keeping qualities that characterized much of the paper made in the past. Modern typography may be described, in comparison, as ephemeral, and confined in its object to the existing generation. It may be that before the present century has closed, the sentiment of taste and fashion will revert again to the old time standard of practice, and choose once more a method of "line" illustration for the more permanent nature of its printed literature.

The time-honoured wood engraver has been almost driven from the field, so general has become the use of this style of block. Most of the ancient books, as already observed, were illustrated by the woodcut method, even before the introduction of typography itself, and therefore its place to-day, when expedition is such an important factor, would be somewhat out of keeping.

The first wood engraving is usually given as that representing St. Christopher and the Infant Saviour, 1423, found in the library of Lord Spencer, at Althorp; but Baron Riffenburg has discovered an earlier woodcut of St. Katherine, date 1418 (cp. Riffenburg, "La Plus Ancienne Gravura connue avec une date," Brussels, 1845).

Engraving on wood was known in Venice comparatively early in the Fifteenth Century, as seen by the publication "Meditations of I. de Turrecremata"—a book illustrated with wood engravings, and printed about that period.

An important change affecting roller-making also became a necessity. The hardness and lack of sensitiveness were not qualities that helped to produce satisfactory results, added to which the faulty blocks at the outset, and the unsuitable ink, were obstacles that had to be surmounted. Ink of the right consistency, suitable to fine distribution, and rollers equally sensitive, were forthcoming, with the result that to-day we have printed specimens surpassing the photograph itself.

One other important consideration in regard to this style of printing had to be met, and that was to lay down machines that would produce these results, now increasingly in demand. Especially is this the case with the fine catalogue illustrations. Such machines as we have already dealt with in another place were made of perfect rigidity, accurate in register and impression, and capable of working the most delicate form of block. It required many years to perfect this class of machinery, and not only was this the case, but the actual printer had to undergo an entire change of tactics. The overlaying of the old style block was no longer required as essential. The successful negative of the photograph, combined with the aid of superior machinery, ink, paper, and rollers, were now the important desiderata, coupled with the increased facilities afforded for the worker by the instituting of technical instruction classes in all the large centres of industry throughout the world.

The form of illustration now almost everywhere in use is that known by the name of half-tone. The object to be reproduced or photographed is focussed through a screen—coarse, medium, or fine grain, with the aid of electric light, as may be required. The negative is then developed on to the plate, of a highly polished nature, and etched in by acid.

As far back as the Fifteenth Century we have some account of a form of engraving on metal, and, in the succeeding century, etching on copper. One of the earliest known impressions of engraving on copper is that executed by one Thomaso Fineguerra, a goldsmith, of Florence, with the date 1460 upon it. Like most of these inventions, it was discovered accidentally.

This brings us to stereotyping and electrotyping—two important branches of the art very much in requisition to-day. The former is largely used for the curved plates used on daily newspapers. The process of making stereotypes was discovered as early as 1735 by William Ged, of Edinburgh. Briefly, the method is one of reproducing letterpress surfaces by taking casts of them. A mould is usually taken from the type forme by means of beating on to the letters with a brush a kind of papier-mache preparation called flong (Plaster of Paris is also used for moulding). It is then placed in a hot box and dried. After this process the molten metal is poured on to it, so forming the stereo. This stereo is taken out, cooled, and mounted (if for ordinary work) on well-seasoned wood or metal block, to make it type high, then planed and finished off ready for use.

Advantages of modern machinery in the rapid output of news are particularly obvious in the case of the "Autoplate"—a machine for making curved stereotype plates. It casts automatically, after which the stereos are hardened, ready for attachment to the rotary presses. The surfaces are made perfect for printing purposes, and the plates are instantly adjusted—the whole operation occupying a comparatively brief space of time thus enabling late news to be inserted up to the very last moment.

The number of runs obtainable from a stereo varies in proportion to the hardness of the metal use in making, but for long numbers a still harder face is necessary, and this is afforded in the Electrotype process. One advantage, however, of having the matrices is that the stereos can be easily replaced at any future time. Celluloid has also been utilized, it is said, for the same purpose; but the objection to this compound would appear to be its highly inflammable nature.

Electrotyping was simultaneously invented by Professor Jacobi (of St. Petersburg), and a Mr. Spencer (of Liverpool), in the year 1837. The method of making electrotypes (generally termed electros) differs somewhat from that of the stereo process, the mould or matrix in this case being taken in wax. This is then dusted with plumbago, to give it a conducting surface and to ensure the adherence of the metal. The positive pole of a battery is attached to the matrix, and the negative to a copper plate, and both are suspended in a bath of sulphate of copper in solution. The copper deposits on the impressed face of the mould in the form of a thin film, which increases in

thickness as the process continues. Having attained the desired thickness it is then removed, the shell detached and strengthened by a deposit or backing of type metal. Before the type metal will adhere to the copper, the back of the shell is coated with tin, and the shell placed face downwards on a plate, by which it is suspended over a bath of molten metal. When it has attained the requisite heat a quantity of the metal is dipped up and floated over the back of the shell. After it is cooled down, it is mounted and finished off in the same manner as the stereotype.

Wood engravings are usually reproduced by this electro process, the original being rarely used for printing, but kept for reproduction purposes.

Another method of obtaining electros from letterpress formes is that of taking impressions on to gutta percha, brushed with graphite, and then immersed in the electroplating bath.

We have already alluded to the importance of photography relative to modern illustrations. The dry plate will, no doubt, in this connection, prove a very important aid in the near future, as already some masterly reproductions of scarce and valuable books have been copied by this means for printing purposes. It is highly probable that movable type may have, in the future, to meet with formidable rivalry in the camera and dry plate.

"Printing without ink" by an electrical machine was promised us, but for the moment it seems, for some reason or other, to be held in abeyance, However, its adaptability is only a matter of time. Modern make of machines, it is claimed, has

been successfully demonstrated with—all equipped for electrical operation with wire connections, and the "resist" arrangement in place of the usual inking appliances. Formes for their testing were locked up with wood furniture only, while the chase was covered with tin foil (or zinc) to permit of insulation. The paper used being damp, but made susceptible to the magneto-electric influence of light by the addition of certain chemicals while it was in the pulp state. When the paper was fed into the machine an electric current was sent across the face of the forme. The paper responded to the current, and the result was a clear and dry impression, which is claimed to be permanent and of a dense black ink. It is at any rate a process that cannot be ignored, and must be reckoned with, although only in an embryonic stage at present. Allowing for the variable cost of current, at from a halfpenny to three halfpence per hour, it probably will allow a large margin of profit on the ink bill, and the cost of the chemically prepared paper, we are told, will be but little more than that of other paper. As the prints come from the machine dry, annoyances and delays arising from the use of ink are apparently obviated. The patentee and inventor is Mr. Friese-Greene.

Mr. Friese-Greene has also demonstrated to a photographic society some recent experiments on electrically printed images, much after the manner of the electrical inkless printing machine. A sheet of white paper being damped, a stereotype block is placed upon it, and an electric current passed through the block and paper. The paper becomes impressed with a latent image, and is then treated in the same way as a photographic

image — developed with re-agents — the paper brushed over with a solution of nitrate of silver, after which the image flashes up of a pale brown colour. If this brown image is brushed over with sulphate of iron it will turn to an intense black.

Very successful developments of the letterpress art are those known as Trichromy (commonly called Three-Colour Printing) and Four-Colour Printing, comprising colour blocks in the three or four primary colours, printed successively, with very pleasing and artistic effects in the finished result.

This process of colour printing has to some extent superseded much hitherto done by Lithography, which has fallen upon evil days in the matter of its small but finer work.

Lithography is based entirely upon chemical principles, i.e., the property possessed by calcareous stones of absorbing, with equal readiness, both aqueous and unctuous or saponaceous substances, and the naturally repellent nature of such bodies, when brought in contact with one another. The stone usually employed is a compact limestone, obtained principally from Bavaria. It is a somewhat tedious and irksome process, but, notwithstanding, it has many advantages, and ranks as one of the most important of the graphic arts, producing a vast amount of work that could not be executed by the letterpress printer. Now that metal is being substituted for stone as a printing surface it is fair to assume that a greater sphere of usefulness will, before long, re-assert the important position of this industry.

The discovery of lithography was made by an actor, named Alois Senefelder, in the year 1800. He enjoyed the exclusive privilege of practising his newly-discovered art in Munich, a city where he eventually died in 1834. A statue has been recently erected to his memory at Solnhofen. Some years elapsed before the discovery found its way into England.

Very little improvement has taken place in the original lithographic machines—which have a capacity of turning out but 500 impressions in the hour, while modern machines have a speed of from 800 to 1000 per hour. There is a tendency everywhere to improve this state of things, and hence we have the introduction of the rotary. In various other ways (amongst others, the dressing and graining the stones, and use of mechanical tint plates), it is shown that efforts are not wanting in bringing about some revival.

The introduction of Algraphy in connection with Lithography, viz., printing from aluminium plates, is making headway in many litho houses "The basic principles of the two methods are identical," says Mr. Jos. Goodman, in an article we quote from *The British Printer*, "the greasy ink of the design forming a fatty compound with aluminium, as it does with the litho stone, the remaining clear parts of the aluminium or stone surface having an aqueous and non-greasy surface, produced by means of etching and gum compound formed in those parts, the greasy parts of the design having an affinity and attraction for the greasy ink on the roller, whilst the clear aqueous or gummed parts imbibe the water and reject the grease; thus the design is maintained and printing effected."

Aluminium would seem to have many advantages over stones on account of its lightness and cheapness, not to speak of its immunity from breakage and freedom from veins and silica patches. However, zinc is found much more acceptable to work upon to a good many, yielding better results. Zinc should also prove acceptable from the fact that clear and sharp transfers can be more readily made therefrom.

In the same category we must also class Collotypes as a most successful style of printing.

The Typewriter, though an innovation, should be mentioned as representing a useful and important adjunct to the counting-house, where it is largely used for correspondence, and by authors and writers for the preparation of copy for the printer. It was invented in 1855 by a Frenchman named M. Foucault. Its general use has developed an extensive industry. In reality it is a type printing machine, and that in a small and compact compass. The work of the Typewriter is of a somewhat temporary nature, as compared with the more permanent results of letterpress printing.

There are numerous other auxiliaries—more or less the outcome of the printing art in its ever widening circle—that it would be impossible to enumerate in detail in this work. The more important phases treating upon the art itself have been dealt with for the most part in their historical bearing.

Enough has been shown, even whilst running the risk of some degree of bias, to give a little idea of the rise and progress of Typography—un-

doubtedly the most royal of all crafts. In the words of a writer (Daunou), "We live too near the epoch of the discovery of printing to judge accurately of its influence, and too far from it to know exactly the circumstances which gave birth to it." The "Fourth Estate" of the realm is the title by which its unique position is recognized to-day. It is the most potent force of modern times, and yet, as Oxonides expresses it, "The art of printing, which has given light to most other things, holds its own head in darkness."

It is only necessary to add, in conclusion, that the common benefits—the fruit of the printing press—are the heritage, as well as the privilege, of all. Education has become general largely through the instrumentality of the press. The forces of ignorance and superstition have been swept away, and the invention of typography in the Fifteenth Century inaugurated the dawn of a new era. To-day its power has indeed become the "mainspring of all our transactions in life," and the race and governments of men are under the deepest obligation to its world-wide and beneficent sway.

> . . . Mightiest of the mighty means,
> On which the arm of progress leans,
> Man's noblest mission to advance,
> His woes assuage, his weal enhance,
> His rights enforce, his wrongs redress,—
> Mightiest of mighty is the Press.—*Sir J. Bowring.*

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